Exhibit 5

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY
CAMDEN VICINAGE

****

IN RE: VALSARTAN, LOSARTAN, AND IRBESARTAN PRODUCTS LIABILITY LITIGATION	MDL No. 2875
	Civil No. 19-2875 (RBK/JS)
THIS DOCUMENT APPLIES TO ALL CASES	HON ROBERT B. KUGLER

****

- CONFIDENTIAL INFORMATION -
SUBJECT TO PROTECTIVE ORDER

Continued Remote Videotaped via Zoom Deposition of MIN LI, Ph.D., commencing at 7:05 a.m. China Standard Time, on the 21st of April, 2021, before Maureen O'Connor Pollard, Registered Diplomate Reporter, Realtime Systems Administrator, Certified Shorthand Reporter.

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None.

Questions Marked Highly Confidential

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None.

P R O C E E D I N G S

THE VIDEOGRAPHER: We're now on the record.

My name is Judy Diaz. I am the legal videographer for Golkow Litigation Services.

Today's date is April 21, 2021, and the time is 7:05 a.m.

This remote video deposition is being held in the matter of Valsartan, Losartan, and Irbesartan Products Liability Litigation MDL.

This is the continuation of the deponent Min Li, Ph.D.

All parties to this deposition are appearing remotely and have agreed to the witness being sworn in remotely.

All counsel will be noted on the stenographic record.

And the court reporter is Maureen Pollard.

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MIN LI, Ph.D.,
having been previously duly remotely sworn, was examined and testified further as follows:
FURTHER EXAMINATION
BY MR. SLATER:
Q. Good evening, or good morning.
A. Good evening.
Q. Dr. Li, did you review any documents since last night's deposition?
A. No.
MR. SLATER: Cheryll, let's put up Exhibit 208, please.
MR. BALL: I think it would be 308.
MR. SLATER: It's an old exhibit.
MR. BALL: Sorry. Sorry.
MR. SLATER: That's okay. It's probably the first time I was right about any exhibit number.
BY MR. SLATER:
Q. On the screen is Exhibit 208, which is titled "Guidance for Industry,

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Genotoxic and Carcinogenic Impurities in Drug Substances and Products: Recommended Approaches," and it's dated December 2008.
Do you see the document in front of you?
A. Yes.
Q. And that's a document you're familiar with, correct?
A. I, you know, read it before.
MR. SLATER: Cheryll, let's turn, if we could, to page 7, please. Great.
Q. Looking under heading IV, Section A is titled "Prevention of Genotoxic and Carcinogenic Impurity Formation."
And it says, "Since drug-related impurities presumably provide limited, if any, therapeutic benefits and because of their potential to cause cancer in humans, every feasible technical effort should be made to prevent the formation of genotoxic or carcinogenic compounds during drug substance synthesis or drug product manufacturing."

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And my question first is, NDMA and NDEA were drug-related impurities with regard to valsartan, correct?
A. Yes.
Q. And -- rephrase.
Neither NDMA or NDEA provided any therapeutic benefits to patients who took valsartan, correct?
A. I'm sorry, say that again?
Q. Sure.
There was no therapeutic benefits, there was nothing positive for the patient about having NDMA and NDEA in the valsartan they were taking, correct?
MR. BALL: Objection. Calls for expert testimony.
A. That I don't know. I mean, that up to toxicologists, you know, medical doctor. I mean, at this point it's probably known, but...
BY MR. SLATER:
Q. Are you saying you think there may have been some benefit to patients?
A. I don't know. I mean, as I

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said, it's best to be answered by toxicologists.
Q. Well, one of the topics here is "ZHP's evaluation and knowledge of the health risks of the nitrosamines, including NDMA and NDEA, including but not limited to as a contaminant of ZHP's valsartan API and ZHP's valsartan finished dose."
You do understand that's one of the topics, correct?
A. Mm-hmm.
Q. In that context, I'm asking you, are you saying there was some health benefit to having NDMA and NDEA in --
A. No, I'm not saying that.
Q. -- the valsartan?
A. I'm not saying that. As I said, you know, based upon up-to-date knowledge, it probably does not have, okay. But the ultimate answer is best to be answered by, you know, toxicologists.
Q. As you sit here now, there's no benefit at all that you can point to of NDMA or NDEA being in ZHP's valsartan, right?

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A. As I already said, you know, up to this point, it does not have any information to show that, as far as I know.
Q. You have no information --
A. I'm not the best person, you know, you know, to provide a professional answer to that.
Q. Well, you're the only person allowed to talk tonight about this, so I'll -- I just want to confirm.
There's no benefit whatsoever that you can think of now to having NDMA or NDEA in ZHP's valsartan, correct?
MR. BALL: Objection. Calls for expert testimony.
And I also think it's outside the scope. It's the health risks of the nitrosamines, not any benefits of the nitrosamines, Adam.
A. I would agree with Rick. I mean, what we talk about here is really its potential risk.
BY MR. SLATER:
Q. I'll ask it differently then.

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The presence of NDMA and NDEA in ZHP's valsartan created a risk; it created no benefit, correct?
MR. BALL: Objection. Compound.
A. It's a potential risk.
BY MR. SLATER:
Q. Certainly having NDMA or NDEA in ZHP's valsartan increased the risk for a person taking those pills to develop cancer. That's why it's called a probable carcinogen, correct?
MR. BALL: Objection. Calls for expert testimony, compound.
A. Again, I'm not the best person, you know, to ask this question. A toxicologist would be much more appropriate.
BY MR. SLATER:
Q. Based on your preparation for the deposition, your review of all the materials you reviewed, you would agree with me that the presence of the NDMA and NDEA in the valsartan created some level of increased risk for cancer for people who took those

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pills, correct?
A. Again --
MR. BALL: Objection. Calls for expert testimony. Go ahead -- and compound.
Go ahead, Dr. Li.
A. If you look at some of the FDA's, you know, issue statement, so their assessment at this point is that overall, you know, the overall risk remains to be very small. So that's all that I can understand.
You know, in terms how much, you know, probability, as I said, again, it's not really for me, you know, to speculate.
BY MR. SLATER:
Q. With regard to the NDMA, without us trying to quantify how much risk there was, you would agree with me that the NDMA in the valsartan increased the risk to some level for the people who took those pills to develop cancer?
MR. BALL: Objection. Calls for expert testimony.
A. You know, basically, I think

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that's the same question that you already asked, you know, quite a few times.
BY MR. SLATER:
Q. Is the answer yes, that to some extent there's an increased risk of cancer?
A. As I told you, I'm not the best person to give an answer on that.
Q. Well, that is one of the topics that you were designated to testify on.
And with due respect to my esteemed colleague Mr. Ball, I don't think it's expert testimony, because it's a Court-ordered designation topic for a corporate representative to answer questions on this. So that's why I'm trying to ask the question.
MR. BALL: Hold on for a second.
We can stay on the record and discuss this, or we can go off the record and discuss it. Which would you prefer to do?
MR. SLATER: I don't need to discuss it. I just wanted to -- I'm

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happy to --
MR. BALL: Then I'm going to continue my objections, and he can answer to the degree he can.
MR. SLATER: Well, I will --
MR. BALL: You can ask him if there were evaluation and knowledge related to --
MR. SLATER: I'm not going to have --
MR. BALL: You mean -- I offered to go off the record, Adam.
MR. SLATER: You don't know what I'm going to say.
MR. BALL: You said you didn't want to.
MR. SLATER: Rick, relax, you don't know what I'm going to say.
I'm going to give you a standing objection to every time I ask a question under this topic that you're going to say calls for expert testimony, I have my position, but that way we don't have to argue about

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it.
MR. BALL: I'm not every time you ask a question on this topic. I'm going to ask the ones that actually call for expert testimony as opposed to ZHP's evaluation and knowledge of the health risks of nitrosamines.
If you want to ask questions about that as opposed to trying to put words in his mouth, that's fine, but that's not what you're doing.
BY MR. SLATER:
Q. The presence of the NDMA in the valsartan created a health risk, correct?
A. I think yesterday, you know, I already answered this question, you know, because according to today's knowledge or whatever the information given by, for example, like FDA's, right, it's not any level, you know, of the presence will give the potential risk. It -- there is a threshold as of today, okay.
As I said yesterday, you know, the daily allowable intake defined by FDA is

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96 nanogram per day.
Q. The NDMA levels in ZHP's valsartan were higher in every single batch that was tested than 96 nanograms, correct?
MR. BALL: Objection. Foundation.
A. As I indicated, you know, this is not correct because you really have to differentiate, you know, the valsartan product from which processes. Okay. From the TEA processes, as far as I know, the vast majority of them, you know, the tested were below the 96 nanogram per day.
BY MR. SLATER:
Q. Let's talk about the zinc chloride process for a moment. Every single batch manufactured with the zinc chloride process exceeded the FDA limit of 96 nanograms, correct?
MR. BALL: Objection. Foundation.
A. Yeah, based upon, yeah, the results, yeah, that we tested, yes.
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BY MR. SLATER:
Q. And for every single one of those valsartan pills that was made with that API with the zinc chloride process, there was a health risk for those patients that used those pills, correct?
MR. BALL: Objection. Foundation. Asks for -- calls for expert testimony.
A. Well, I think the correct answer or the statement or description would be potential risk.
BY MR. SLATER:
Q. The -- you used the word last night "consensus." The scientific consensus, the majority of scientists who know -- who are looking at this issue would agree that there was an increased risk for those patients who used the zinc chloride valsartan manufactured by ZHP, they -- rephrase. Let me ask it again.
The consensus is that using the valsartan that was manufactured with the zinc chloride process increased those patients'

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risk to develop cancer. We don't have to argue about how much of an increase it is, but you'd agree there was some increase as a result of taking those pills, correct?

MR. BALL: Objection. Speculative, vague, and calls for expert testimony.

A. Again, the risk is potential risk.

MR. SLATER: Please go, Cheryll, to page 8, if you could. The top of the page. Perfect.

BY MR. SLATER:

Q. At the top of page 8 there's discussion about the threshold approach, and it says in the last sentence, "However, there are some compounds containing certain structural groups (aflatoxin-like, N-nitroso-, and azoxy-structures) that have extremely high carcinogenic potency and are excluded from the threshold approach."

You understand that, correct?

A. Yes.

Q. And N-nitroso compounds

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includes NDMA and NDEA, correct?

A. Yes.

Q. And the reason that they're excluded from the threshold approach is because they're considered to be so dangerous that they have to be evaluated on an item-by-item basis, correct?

MR. BALL: Objection. Calls for expert testimony, vague.

A. I need to point out that here, you know, the wording here, high carcinogen, carcinogenic, you know, potency is really referring to animal studies.

BY MR. SLATER:

Q. Whatever studies it may be based on, the consensus is that NDMA, for example, has extremely high carcinogenic potency and increases the risk of the patient using a pill contaminated with NDMA of developing cancer, correct?

MR. BALL: Objection. Vague, calls for speculation, expert testimony.

A. Again, this is a potential

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risk.

BY MR. SLATER:

Q. It's a potential risk that no patient would knowingly ever accept if they had a choice of any other pill to control their blood pressure, you would agree with that, right?

MR. BALL: Objection. Speculative.

A. Whatever medicine a patient need to take, they need to ask or consult with their doctors.

BY MR. SLATER:

Q. Well, ZHP understands that the reason that the worldwide regulatory authorities required ZHP to stop selling its valsartan was because the risk to patients of developing cancer due to the nitrosamine contamination was considered to be too great. You understand that, right?

MR. BALL: Objection. Speculative.

A. I think yesterday, yes, sir, I indicated we voluntarily pull recall. Okay.

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And also as I mentioned yesterday, you know, once we have complete our very intense, you know, investigation, like it was in like two, three weeks, you know, once we have, you know, a -- you know, good numbers of, you know, of the value of the NDMA, we immediately contact FDA as well as, you know, other regulatory agencies. Okay. We ask FDA for, you know, guidance, right. We ask them whether we should immediately do the recall.

And as I mentioned yesterday, the answer, or at least the initial answer from the FDA, they ask us to hold on upon further notifications. Okay, so this is exactly what happened.

BY MR. SLATER:

Q. Let's go through a few of the things you just said.

Number one, you're saying ZHP made the decision to voluntarily recall the valsartan contaminated with nitrosamines. Did I understand you correctly?

A. As I said, we contacted -- once we, you know, have the results or the initial

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results, we contacted FDA, okay, asking whether we just should go ahead with the recall.
Q. You understood that a recall was likely the appropriate next step after you confirmed the nitrosamine contamination of your valsartan, and that's why you asked that question of the FDA, is that what you're saying?
MR. BALL: Objection. Outside the scope.
Go ahead and answer, Dr. Li.
A. Because there was a potential risk, right, so as a responsible company, you know, once you confirm the initial results, you know, have reliable results, you know, to your best knowledge, you know, this is a response the company should do, so that's what ZHP did.
BY MR. SLATER:
Q. As soon as ZHP knew that its valsartan was contaminated with NDMA, the responsible thing to do, as you just said, was to contact the FDA and take steps to

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recall the pills, correct?
MR. BALL: Objection. Compound, and mischaracterizes his testimony.
A. Yeah, that's basically what I said. Yeah.
BY MR. SLATER:
Q. ZHP did not do that as of July 2017, correct?
A. That I need to go to, I think, one of the documents. We have the timetable of, you know, chronology of all the events. I don't remember all the details.
But basically the thing is, as I said, once we complete our initial investigations, okay, and we just, you know, quickly contact FDA. And I think between the initial contact and the FDA's next, you know, actions, there -- the time was at least about a week or maybe even longer, okay.
Q. I think maybe you misheard my question. I'll ask it again.
As of July 27, 2017 --
A. Oh, I'm sorry. 2000 -- well,

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as I said, as a company as a whole, you know, we didn't know that.
Q. People within your company knew this, correct?
MR. BALL: Objection. Vague, speculative.
BY MR. SLATER:
Q. All right. I'll ask the question again. Stop for a second, Dr. Li, I'll ask the question again.
As of July 27, 2017, there were people in your company who were on notice, including you, that the valsartan manufactured with the zinc chloride process was contaminated with NDMA, correct?
A. No, that's not true. As I indicated yesterday, you know, based upon, you know, the content, you know, of that particular exhibit, you know, it looks like he was making his speculations.
Q. Whatever you want to call it, speculations, he was correct and that was confirmed for the worldwide regulatory authorities, including the FDA, right, that

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NDMA was in the valsartan that your company was selling, right?
MR. BALL: Objection. Vague and compound.
A. That was after, you know, the company become aware, after, you know, the June 6, 2018.
BY MR. SLATER:
Q. Well, it was after ZHP realized that if it didn't tell the FDA about the contamination with NDMA, that Novartis was probably going to do so, so ZHP had no choice at that point, right?
MR. BALL: Objection. Speculative and compound.
A. That's your speculation. That's not, you know, what I felt.
BY MR. SLATER:
Q. Let's go back to my original question.
In July of 2017, ZHP did not notify the FDA that there was NDMA in the zinc chloride process manufactured valsartan, correct?

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A. As I told you, you know, the company did not know at the time.
Q. I'm not -- well, my question is whether or not the company notified the FDA at that time.
MR. BALL: Dr. Li, that's a yes-or-no question. To the degree you can answer yes or no, please answer yes or no.
A. Well, because the company did not know, so the answer is no.
BY MR. SLATER:
Q. You said earlier that the FDA told ZHP not to recall the valsartan immediately, or something to that effect, correct?
A. Something like that, yes.
Q. And that was because the FDA first needed to ensure that there was adequate supply of blood pressure pills before these pills would be pulled off the market, because as bad as it was to have an increased risk of cancer over time, it could be worse for people to start having strokes

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and heart attacks because they don't have the blood pressure pills over the next week.
You understood that's what the FDA was evaluating, right?
MR. BALL: Objection. Speculation, calls for expert testimony, compound, and I think every other objection to form I could think.
A. Yeah, I don't know exactly what FDA was thinking at the time.
BY MR. SLATER:
Q. Well, you're talking about what the FDA -- you affirmatively -- rephrase.
You're the one who brought up what the FDA told you or didn't tell you, so that's why I'm asking what those discussions were.
You apparently know about them, right?
A. They didn't tell us the reason. They just said hold on.
Q. Shortly after ZHP notified the FDA about the NDMA in ZHP's valsartan, ZHP stopped selling the valsartan and recalled

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it, correct?
MR. BALL: Objection. Compound.
A. I'm sorry. Say that again, please?
BY MR. SLATER:
Q. Sure.
Shortly after ZHP notified the FDA that there was NDMA in the valsartan, within a short period of time after that, ZHP stopped selling that valsartan and recalled it in the United States and worldwide, correct?
MR. BALL: Objection. Vague, compound.
A. I think I would really need to, you know, take a look at that particular timetable, you know, describing, you know, like which events happened.
You know, it might -- we might already, you know, like have stopped the production, you know, or it may, you know, happen almost at the same time.
But as I said, we have that

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document. So I think the best way is just, you know, you know, you can upload that document. I mean, let's take a look, you know, what exactly, you know, going to happen every step.
BY MR. SLATER:
Q. The reason that ZHP, as you said, made the decision to recall and stop selling its contaminated valsartan was because ZHP deemed the health risk to patients to be unacceptable, correct?
MR. BALL: Objection. Vague and compound.
A. Again, I said it's a potential risk.
BY MR. SLATER:
Q. And it's a potential risk that's unacceptable -- rephrase.
And it was a potential risk that was unacceptable for patients, correct?
MR. BALL: Objection. Vague, and calls for expert testimony.
A. Again, it's a potential risk to patient.

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BY MR. SLATER:
Q. An unacceptable potential risk. That's why ZHP stopped selling valsartan and recalled it, correct?
MR. BALL: Objection. Vague, mischaracterizes his prior testimony, and foundation.
A. So according -- you know, basically once we knew, you know, the presence of NDMA, and, you know, once we knew potentially, okay, to the patient, we -- you know, as I said, after we confirmed the results, okay, you know, we stopped the production and distribution, and also contact, you know, regulatory agencies.
BY MR. SLATER:
Q. And that's because ZHP knew that the potential risk to patients of taking those pills was an unacceptable health risk, correct?
MR. BALL: Objection. Vague, calls for expert testimony, and mischaracterizes his earlier testimony.

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A. Again, you know, as I said, you know, you know, the best answer would be by a toxicologist in terms of what level, you know, is acceptable, what level is not acceptable.
BY MR. SLATER:
Q. I am asking you the questions because you were designated by ZHP to testify on this topic, so you're the person I have to ask the questions.
MR. BALL: That's not what you're asking him, Adam. You're asking him things that are outside the -- you're asking for expert testimony, you're not asking for factual testimony, and you're putting words in his mouth.
So feel free to ask him questions which were within the topic. I'm happy to have you do that.
MR. SLATER: Cheryll, let's go now to a new exhibit. Let's go to Exhibit 206, please. Thank you.
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BY MR. SLATER:
Q. On the screen is Exhibit 206, which is the June 28, 2006 European Medicines Agency Guidelines on the Limits of Genotoxic Impurities, which was valid from January 1, 2007 to January 31, 2018.
Do you see that?
A. Mm-hmm.
MR. SLATER: Cheryll, let's go, if we could, to page 4 of 8 at the top, the section titled "Toxicological Background," please.
THE WITNESS: Could you make it a little bigger, please? Yes. Thank you.
BY MR. SLATER:
Q. Section 4 of this document from the European Medicines Agency is titled "Toxicological Background," and it states, "According to current regulatory practice it is assumed that (in vivo) genotoxic compounds have the potential to damage DNA at any level of exposure and that such damage may lead/contribute to tumour development. Thus

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for genotoxic carcinogens it is prudent to assume that there is no discernible threshold and that any level of exposure carries a risk."
Do you see that?
A. Yes.
Q. NDMA is a genotoxic compound as discussed here, correct?
A. Yes.
Q. NDEA is a genotoxic compound as discussed here, correct?
MR. BALL: Objection. Vague.
A. Yes.
BY MR. SLATER:
Q. And when they talk about the potential to damage DNA at any level of exposure, they're talking about these being mutagenic genotoxic compounds, correct?
MR. BALL: Objection. Speculative and vague, calls for expert testimony.
Go ahead and answer.
A. To the animals. These results all derived from animal studies.

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BY MR. SLATER:
Q. Your understanding is that this standard was written to determine whether or to what extent genotoxic compounds would be given to animals?
MR. BALL: Objection to form.
Dr. Li, please let me get my objection in.
Mischaracterizes his earlier testimony.
A. Well, basically all of those results, okay, based upon, you know, you know, documents like this, they all derived from animal studies at very high dosage.
BY MR. SLATER:
Q. Okay. Coming back to the question I asked you, when this refers to the potential to damage DNA at any level of exposure, that's talking about it being a mutagenic, genotoxic compound, correct?
MR. BALL: Objection. Speculative.
A. As I said, that the potential risk here or understanding of whatever the

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description here, it was derived from animal studies. And also, I'm not sure, you know, you know, the current, you know, M7, whatever the exactly same, you know, opinion, you know, you know, on this. I think in M7 it probably has an acceptable levels. So maybe that's why the reason, you know, you know, this document become obsolete.
BY MR. SLATER:
Q. I'll try it again.
When this refers to geno- -- rephrase.
When this refers to genotoxic compounds have the potential to damage DNA at any level of exposure, that's talking about these genotoxic compounds being mutagenic, that's what that means, correct?
A. What I understand --
MR. BALL: Objection --
THE WITNESS: Go ahead.
MR. BALL: Objection. Speculative, calls for expert testimony.
To the degree you can answer

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under your understanding, go ahead, Doctor.
A. Right. Yeah. So based upon what I understand, all of these data are results from animal studies, and it was very high, you know, doses.
BY MR. SLATER:
Q. Did I ask you what the basis for this statement was in this EMA guidance document in terms of what type of studies this was based on?
A. From some of the other documents, I don't, you know, remember, like, you know, either like M7 or some other -- FDA's document or EMA's document, or if you can go to the literature, you know, all of those data with nitrosamine, they were derived from animal studies, as far as I know.
Q. The reference to genotoxic compounds have the potential to damage DNA at any level of exposure is a reference to mutagenic/genotoxic compounds. That's what mutagenic means, right?

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MR. BALL: Objection. Compound, calls for expert testimony, speculative, and foundation.
A. Again, as I said, you know, basically this statement, based upon my understanding, okay, this statement was based upon animal studies, okay, with very high doses.
MR. BALL: Adam, he's clearly not understanding the question. Maybe if you ask it in a different way.
MR. SLATER: This is a Ph.D from Johns Hopkins.
MR. BALL: Okay. Adam, would you like me to ask him a question?
MR. SLATER: No.
MR. BALL: I want to -- okay. I'm just trying to help you out, buddy. I -- you know, I'm saying if you're going to say that he's a Ph.D, I'm just suggesting he's clearly not understanding the question, because I kind of understand the question, but he is not.

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MR. SLATER: That's okay. I'll do -- I'm doing the best I can.
MR. BALL: That's okay.
MR. SLATER: But I would prefer that you not ask the questions.
MR. BALL: That's fine. I won't, then.
MR. SLATER: Thank you.
BY MR. SLATER:
Q. What does the term "mutagenic" mean?
A. Mutagenic, which means it cause mutation in genes.
Q. Damage to someone's DNA, correct?
MR. BALL: Objection. Vague.
A. As I said here, you know, referring to this very statement here, okay, it's based upon animal study, okay. Animal study at the very high doses, okay, it shows mutagenic to animals.
BY MR. SLATER:
Q. A mutagenic/genotoxic impurity by definition is one which can damage DNA,

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correct?
A. Yeah, at very high doses.
Q. This document from the European Medicines Agency states in the sentence we just went over, "Thus for genotoxic carcinogens it is prudent to assume that there is no discernible threshold and that any level of exposure carries a risk."
That's a true statement, correct? ZHP agrees with that statement, right?
A. That is a statement in that document, yes, 2008.
MR. SLATER: Let's go to page 6, please, Cheryll. Thank you. Scroll up a little bit. A little more. Wonderful. Thank you.
Q. Looking at the center of the page, the first full paragraph, this EMA document states, "Some structural groups were identified to be of such high potency that intakes even below the threshold of toxicological concern would be associated with a high probability of a significant

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carcinogenic risk," and then there's citations to two articles, one from 1999 and one from 2004.
Do you see that?
A. Yes.
Q. A significant carcinogenic risk would be a significant risk of developing cancer. That's what that phrase means, correct?
MR. BALL: Objection. Foundation.
A. It says a high probability. And again, although I haven't gone through these two papers, but based upon everything, you know, that I know, these results most likely derived from animal studies.
BY MR. SLATER:
Q. When this phrase -- rephrase.
When this refers to a significant carcinogenic risk, that means by definition a significant risk of developing cancer, correct? That's what those words mean, right?
MR. BALL: Objection. Vague,

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foundation.
A. It says, "a high probability of a significant carcinogenic risk." It's still a probability, although it's a high probability.
Again, you know, this is from animal studies.
BY MR. SLATER:
Q. A significant carcinogenic risk is a significant risk of developing cancer, correct?
MR. BALL: Objection. Vague, foundation.
A. No matter what, you know, it's still a probability.
BY MR. SLATER:
Q. A carcinogenic risk is a risk of developing cancer, correct?
MR. BALL: Objection. Vague, foundation, and calls for expert testimony.
A. Well, based upon this wording, right, this specific wording, carcinogenic risk, you're right, it is, you know,

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developing the risk for developing cancer. But as I said here, if you look at the whole sentence, okay, it says, "a high probability of a significant carcinogenic risk." So it's still a risk.

And again, you know, as I said, these study most likely, you know, based upon animal studies.

BY MR. SLATER:

Q. Does ZHP think it is a good idea to sell pills contaminated with a substance that carry with them a high probability of a significant carcinogenic risk?

MR. BALL: Objection. Argumentative, foundation.

A. As I told you, you know, as a company we didn't know until June 6, 2018. So, you know, the company will not knowingly, you know, you know, to distribute the product. So that's why, as I say, once we knew, you know, at the company level and once we determined, you know, the levels, okay, so we did everything we can and contact agency

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and, you know, initiate the recall, you know, everything.

MR. SLATER: Cheryll, you switched the page for some reason.

Can you scroll up a little bit again just to get that paragraph a little higher up on the page? Thank you. That's good.

BY MR. SLATER:

Q. It was not acceptable to sell valsartan with NDMA contamination because of the high probability of a significant carcinogenic risk, correct?

MR. BALL: Objection. Mischaracterizes his earlier testimony, calls for expert testimony.

A. You know, as I told you, you know, once, you know, once we knew, you know, in June 2018 and once we determined, you know, the levels, we immediately, you know, contacted regulatory agencies and take actions.

BY MR. SLATER:

Q. Are you aware of studies that

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have been done concluding that it is probable that NDMA will cause cancer in humans?

A. I don't know, you know, what -- which is specific like a paper or study, you know, that you are referring to, I mean.

Q. Are you saying you're not familiar with anything in the scientific literature at all that says that it's probable that NDMA will cause cancer in humans?

MR. BALL: Objection. Mischaracterizes his testimony.

A. As I said, that, you know, basically as I said, you know, people making those hypothesis or whatever, based upon animal studies, okay.

BY MR. SLATER:

Q. In preparing yourself to talk about ZHP's evaluation and knowledge of the health risks of nitrosamines, including NDMA and NDEA, including but not limited to as a contaminant of ZHP's valsartan API and ZHP's valsartan finished dose, did you review any studies addressing risk to humans of

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developing cancer due to exposure to NDMA?

A. Yes, I did review some papers, okay. There is one particular, you know, paper, you know, they came out after ranitidine, you know, NDMA issue was, you know, was discovered, okay.

That paper from my own perspective, right, from a scientific design, I think, you know, this is a very good study, okay? This study was published by a group of Korean, you know, medical doctors. Okay.

In this particular, you know, retrospective review, right, they compared 40,000 patients, or maybe 40-plus thousand, okay, patients taking ranitidine, okay.

Ranitidine by now, you know, people know it will -- you know, ranitidine will decompose, and also -- it will also, you know, you know, metabolize within human body, okay, to very high level of NDMA.

I think yesterday I may have mentioned, I think, an average level, you know, you know, with a single person taking 150 milligram of ranitidine, was 47 microgram

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per day, okay?
And they compared, you know, this group of patient with another group of patient, 10,000-plus patient, taking another -- you know, same class, like an antacid, you know, drug which is called famotidine, okay.
Famotidine, it is known by now it will not, you know, decompose to give NDMA, or it will not, you know, be metabolized to give NDMA, right?
So they compared these two group of people retrospectively. And the conclusion from this, you know, very well, you know, controlled study, they -- I think the conclusion says there is no -- basically there's no difference in terms of the cancer risk between the two groups.
Q. Is that the only study you're aware of that's addressed this issue?
A. That's the study that I just came across most recently. The vast majority, you know, of the other paper, as far as I, you know, came across, you know,

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they seem to be all -- you know, all, like, related to animal.
There may be like, you know, another one. They may be doing a similar study, you know. But to me, you know, the study design, you know, may not be very well, you know, controlled.
I mean, because whenever you do those things you -- from a scientific basis, you know, you need to well control, you know, you know, your patient population. And also your patient population need to be large enough to be statistically meaningful, right?
So in this case, 40-plus thousand versus 10,000, you know, 10,000-plus control group, you know, to me it's a very well-controlled study.
Q. So you mentioned a study done out of Korea. Are you aware of any other studies addressing the risk of cancer to humans due to nitrosamines?
A. There may be some, but I haven't -- you know, due to my limited time, I haven't, you know, had a chance to go

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through them, you know.
But as I said, you know, over the course, you know, since June 2018, it seems to me, you know, the vast majority of the studies were based upon the animals.
Q. Does ZHP have a collection of literature regarding the risk to humans of nitrosamine ingestion?
A. I don't know that there is like a -- like a complete, like a compilation, but -- you know, but for myself during the course of this preparation, I downloaded some papers.
Q. You've told us about a study out of Korea. Is there any other study known to you or ZHP as you sit here now addressing the risk to humans due to ingestion of nitrosamines?
A. There may be some others, but as I said, you know, I haven't had a time, you know, you know, to go through them. So I don't know the specifics, you know, the other ones. Maybe the other ones, you know, as I said, I just came across.

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But this particular one, because of, as I said, well designed, you know, studies with large significant, you know, you know, patient populations.
Q. Coming back to the EMA standard, this indicates in the paragraph we've been reading on page 6, in the second sentence, "This group of high potency genotoxic carcinogens comprises aflatoxin-like, N-nitroso-, and azoxy-compounds that have to be excluded from the threshold of toxicological concern approach. Risk assessment of members of such groups require compound-specific toxicity data."
Do you see what I just read?
A. Yes.
Q. And, again, when they -- rephrase.
When the EMA standards -- rephrase.
When this EMA guidance document refers to N-nitroso-, they're talking about nitrosamines including NDMA, correct?

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A. NDMA is one member of this class compound.
Q. And another -- rephrase.
Another nitroso compound is NDEA, correct?
A. Yes.
Q. And the European Regulatory -- rephrase.
The European Medicines -- rephrase.
The European Medicines Agency referred to NDMA and NDEA as "high potency genotoxic carcinogens." That's how they're referenced in this guidance document, correct?
A. As a group, they are potentially high -- you know, high potency, right. Here it says, yeah, you need to have a, you know, compound, you know, you know, specific.
But also, you know, like I indicated yesterday, not all nitrosamine compound they have the same, you know, potential risk, okay? For example, as I

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mentioned, you know, impurity K of valsartan, it has been treated as a regular impurity by the original innovator, Novartis.
Q. In terms of the nitrosamines that are high potency genotoxic carcinogenics, one of those is NDMA, right?
A. As I said, the NDMA or NDEA, they have potentially high risk -- potential high risk, based upon animal studies.
Q. That potential high risk is considered to be unacceptable in valsartan, correct?
MR. BALL: Objection. Foundation, calls for expert testimony.
A. I think I answered, you know, this question before. You know, with regard to, you know, acceptable level in patient, I think it's best answered by a toxicologist.
BY MR. SLATER:
Q. In terms of what actually happened in June of 2018, the consensus among those scientists responsible for this issue in the United States was that this risk was

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unacceptable for patients, correct?
MR. BALL: Objection. Vague, calls for expert testimony, and speculative.
A. I think this is the same question you just asked before.
BY MR. SLATER:
Q. Is the answer yes?
MR. BALL: Go ahead and answer if you can, Dr. Li.
A. I already told you, you know, this would be best answered, you know, by a toxicologist.
BY MR. SLATER:
Q. Well, I'm just asking, factually the answer is yes, correct? That's why you stopped selling valsartan, correct?
MR. BALL: Objection. Mischaracterizes earlier testimony, vague and speculative, and lacks foundation.
A. Again, you know, as I answered it before, you know, the reason we, you know, stop after, you know, we did our, you know,

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thorough investigation is based upon the potential risk.
BY MR. SLATER:
Q. All risks are potential, correct?
MR. BALL: Objection. Vague.
BY MR. SLATER:
Q. That's why they're called risks.
MR. BALL: Objection. Compound.
A. I don't -- certain -- well, it's all how you define it. There's certain risk is confirmed, okay? It really, I guess, depends upon the context when you discuss risk.
I mean, I'm not an expert, you know, you know, you know, like, you know, you know, to discuss that exactly definition, you know, you know, of risk, but I know, you know, people use potential risks.
And also, you know, sometimes, you know, they just use, you know, like seems to be like a -- you know, a confirmed risk.

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BY MR. SLATER:
Q. The scientific consensus is that ingesting NDMA as a contaminant of valsartan poses a health risk to those people that take the pills, correct?
MR. BALL: Objection. Objection. Foundation, calls for expert testimony, and speculative.
A. I think you already asked several times. You know, essentially this is the same question you asked before. I think I already answered that.
BY MR. SLATER:
Q. Well, is the answer to that question yes? The answer is yes, right?
MR. BALL: Objection. Mischaracterizes his earlier testimony.
A. As I said, you know, our decision was based upon potential risk to humans.
MR. SLATER: Cheryll, we can take that one down. Give me one second to get organized, I will tell

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you what we're going to next, or ask you to take us to where we're going next.
Okay. Let's go to ZHP01390339, please.
(Whereupon, Exhibit Number ZHP-306 was marked for identification.)
MR. BALL: Hey, Adam, do you guys have a translated version of this that I can look at?
MR. SLATER: I think so. Cheryll can confirm. If we don't we'll make one for you, but I think we do.
MS. CALDERON: Give me one second, I'll put it in the --
MR. SLATER: No problem. Take your time.
(Pause.)
MR. SLATER: Are we good?
MR. BALL: I still don't have it. Hold on, maybe I need to refresh, sorry. No, I still -- I only have the

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305. Do you have like a 305A or a 306?
MS. CALDERON: I'm trying to load it now. Just give me one second.
MR. BALL: Okay.
MR. SLATER: Just let me know.
MS. CALDERON: All right. I was on mute.
Do you see it?
MR. BALL: Let me refresh. Is it 306?
MS. CALDERON: I did 306-t.
MR. BALL: Yep, got it. Thank you. I'm trying to open it now.
(Whereupon, Exhibit Number ZHP-306-t was marked for identification.)
MR. BALL: Cheryll, that's not showing me any -- there we go, okay. Sorry. It opened.
MS. CALDERON: Okay.
MR. BALL: It just look a long time to open, sorry.
///

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BY MR. SLATER:
Q. Okay. On the screen we have Exhibit -- gosh, I don't know what number we're up to. I lost track.
MS. CALDERON: 306.
MR. SLATER: 306.
Q. On the screen we have Exhibit 306, which is an e-mail that was sent to you on September 25, 2018. Who sent that e-mail to you?
A. It's Mr. Lin.
Q. Jinsheng Lin?
A. Yes, Jinsheng Lin. Yes.
Q. And just to refresh our recollection again, as of 2018 what was his position in your department?
A. I think he should be like associate technical director.
Q. Mr. Lin wrote to you, and since the e-mail is short, maybe you could tell us what it says, please.
A. Sure. Yeah, basically, you know, it's the same thing, you know, for the title of the attachment. Yeah, essentially

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it's the list of the potential organic impurity of valsartan basically. Yeah, that's what it is.
Q. It says that there's a list of potential organic purities for valsartan and points out that impurity K is not listed, correct?
A. Oh, yes, mm-hmm, it says, yes.
Q. And why did he point out that impurity K was not listed in this list of potential organic purities for valsartan?
MR. BALL: Objection.
I think you mean impurities, Adam, not purities.
MR. SLATER: Did I say purities?
MR. BALL: You said purities.
BY MR. SLATER:
Q. Oh. I'll ask it again.
Why did Mr. Lin point out to you that impurity K was not listed in this list of potential organic impurities for valsartan?
A. I don't know. I don't know why

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he did that. Maybe that's already confirmed, you know. So because here it says list of potential, so impurity K, you know, because as I said, you know, from the very beginning it has been controlled as a regular impurity, and it's sort of -- you know, at this point, you know, it's quite well-known.
Q. If I understand what you've been saying is it's your testimony that impurity K was controlled as a regular impurity, not as a nitrosamine impurity, is that what you're telling me?
A. Yes.
MR. BALL: Objection. Mischaracterizes his testimony. But go ahead. Sorry.
A. Yeah, the answer is yes.
MR. SLATER: Let's go now to a new document, ZHP00457705, which we will mark as Exhibit 307.
(Whereupon, Exhibit Numbers ZHP-307 and ZHP-307-t were marked for identification.)
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MR. SLATER: And hopefully we'll turn it.
MR. BALL: Yeah, can we upload an English version for me? Thank you.
THE WITNESS: Could you increase the scale? It's --
MR. SLATER: Cheryll, download the -- upload the English version first, let's get that to Rick first, and then we'll worry about this document.
MS. CALDERON: I am having an issue uploading to the link, I just have to restart it. If you just give me a minute.
MR. SLATER: No problem.
Can we go off? I just got a message from Cheryll, she's lost her feed.
MR. BALL: Okay. That's fine.
Do you want to take a break now then, Adam? We've got about an hour ten.
MR. SLATER: That's fine.

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That's probably a good idea.
MR. BALL: Okay. Go ahead.
MR. SLATER: Let's go off the record, Judy.
MR. BALL: Yeah, go off the record.
THE VIDEOGRAPHER: The time right now is 8:14 a.m. We're off the record.
(Whereupon, a recess was taken.)
THE VIDEOGRAPHER: The time right now is 8:29 a.m. We're back on the record.
BY MR. SLATER:
Q. On the screen is a document we've marked as Exhibit 307. Do you see that?
A. Mm-hmm.
Q. And what's the title of that document? What does it say at the top?
A. It says "Drug Substance Product Deficiency Letter Progress," and then it looks like a date, 2020, March 19th.

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Q. So this is a list of deficiency letters having to do with the drug substances and their progress in being responded to?
A. Yes.
Q. Looking at the --
MR. SLATER: If you could scroll up a little bit, Cheryll, so we get all of Box 5. Great. You've got to scroll down a little bit, actually.
MR. BALL: Adam, can I say one thing?
MR. SLATER: What?
MR. BALL: The English translation of this, it makes no sense at all, none. I'm sure Cheryll could read it to you and let you know that it makes no sense.
We'll go ahead with the deposition, and if I have questions regarding what Dr. Li is reading, we can -- we can address that, but --
MR. SLATER: Do you want to -- do you want to take a moment, we'll go off and you can have it translated?

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MR. BALL: No, I'd like you to provide a translation that's actually understandable. For example, I can read you some of what it says --
MR. SLATER: No, I don't need you to. I'm saying -- let's go off the record for a second if we're going to discuss this.
MR. BALL: Okay.
THE VIDEOGRAPHER: The time right now is 8:30 a.m. We're off the record.
(Off the record discussion.)
THE VIDEOGRAPHER: The time right now is 8:32 a.m. We're back on the record.
BY MR. SLATER:
Q. Looking at Box Number 5 -- actually let's start at the top with the headings.
The left-hand column the heading is "Number," so we can understand that. That's just a listing of each of the deficiency letters?

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A. Mm-hmm.
Q. The next column next to Number, what does that heading say?
A. That's the product name.
Q. What's the third column heading?
A. It's the market.
Q. When you say "the market," meaning the country where it's sold?
A. Right.
Q. What's the fourth column heading?
A. The fourth column, you mean in terms of market, right?
Q. The first column was number, the second column was the product name, the third was the market. What's the fourth column heading?
A. Oh, I'm sorry. Basically it's the summary of the main issue. Yeah.
Q. What is the fifth column heading?
A. The fifth column heading -- you mean you want me to go through, you know, the

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summary of the main deficiency or the main issue?
Q. No. What I'm asking you is, we've been going across the top row where the headings -- where the titles of each of the columns is set forth.
So the left-hand column, the first column was number.
A. Uh-huh.
Q. The second column was product name.
A. Right.
Q. The third column was the market.
A. Right.
Q. The fourth column was the summary of the main issue.
I'm asking you what the heading on the fifth column is now.
A. Oh, I'm sorry. Okay. That's the progress. Yeah, current status and the progress.
Q. Okay. And what's the last column, the sixth column?

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A. That's the expected submission, you know, to the regulatory agencies.
Q. When you say "the expected submission," is that a date or --
A. Or day or, yeah, or month, whatever, yeah.
Q. Now, applying those headings, we'll be able to walk through the fifth row, number 5.
Do you see number 5 down there?
A. Mm-hmm, yep.
Q. What is the product name for row 5?
A. Valsartan.
Q. What is the market?
A. US market.
Q. Then in the summary of the main issue, tell me if I understand this correctly. The first line has to do with reprocessing plan for the NDMA and the NDEA for the old process?
MR. BALL: Adam, I'm going to object. You clearly have an English translation of this that you have

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refused to share with us. So you may proceed if you want, but --
MR. SLATER: What I said is I don't have a translation of the entire document. That's why I asked Dr. Li to translate.
But why don't we go off the record. Hang on. Let's go off the record.
THE VIDEOGRAPHER: The time right now is 8:36 a.m. We're off the record.
(Off the record discussion.)
THE VIDEOGRAPHER: The time right now is 8:36 a.m. We're back on the record.
BY MR. SLATER:
Q. Looking at line number 2 in the fourth column, can you tell me what that says, please?
A. You mean the number 1 in the first column, right?
Q. Well, we just went through number 1, right?

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A. Okay. Yeah, okay, yeah.
Q. Let me ask the question.
In the fourth column, which is the heading you said was summary of the main issue --
A. Right.
Q. -- what does number 2 say?
A. It says, impurity K and impurity L, it said required to be controlled as nitrosamine impurity.
Q. And that would have been the requirement from the FDA in the United States, correct?
MR. BALL: Objection. Calls for expert -- calls for a legal conclusion.
A. Let me provide a more complete background, okay?
So, as I mentioned, you know, since the very beginning, you know, impurity K and -- you know, has been controlled as a regular impurity, okay, at 1,000 ppm.
And impurity L is a, you know,

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closed structure analog of impurity K. So essentially it's like the impurity of the impurity, okay.
And based upon the quantitative, you know, structure-activity relationship, okay, impurity L, you know, can be also treated as a regular impurity, okay.
And so with regard to this particular request or the deficiency letter from the FDA, right, during -- well, this is because we filed an amendment, okay, as far as I understand, okay, to the FDA submitting our, you know, optimized or -- you know, with a separate quenching valsartan, you know, improved process, okay?
So in that submission we were -- you know, we were referring to, you know, the control of, you know, impurity K as a regular impurity by pointing or referencing European, you know, you know, you know, regulatory documents, okay.
And then FDA responded, right? I think that was like about, you know, more than one year ago, okay. FDA basically says,

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okay, if I, you know, remember, you know, correctly, I think it basically says for impurity K, although it said your statement saying, you know, impurity K is Ames negative, right?

And however, okay, at that point, okay, FDA says we still need you guys to, you know -- you have some like -- you know, like two or three options, okay, to go ahead.

First, we require you to do, you know, in vivo animal studies, right, so that's number one.

Number two, if you, you know, was not able to do the animal study, then you need to control as, you know, as a nitrosamine or treated as a nitrosamine impurity. Okay. So that's where, you know -- you know, how the issue basically, you know, came out.

So for this specific request, right, and from our regulatory, you know, you know, affairs department, I think, you know, they probably, you know, requires, you know,

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you know, CEMAT to develop a -- like a quantitative method to give a more accurate, you know, you know, method to control, you know, you know, to see either, you know, you know, impurity K or L can be controlled as a nitrosamine impurity, which means, you know, a specification of like 26.5 nanogram per day, okay?

So I think, yeah, this is, you know, you know, you know, is -- basically, again, if my memory, you know, you know, you know, is correct, so this is basically how, you know, this came out, right?

I think in the end, based upon our study, impurity K could not be, you know, controlled at such a low level, okay, due to the nature of the process chemistry. Okay?

So then after that, we revert to another, you know, like option 1, right, because FDA say, you know, you need to do the in vivo animal study. And if the animal study results is negative, then, you know, you communicate that to us and then we'll -- you know, basically, you know, they will

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decide whether, you know, it can be qualified as a regular impurity.

So in the end we, you know, contracted an external, you know, CRO, okay, to do a particular in vivo animal study; it's called a comet assay.

This particular comet assay is also mentioned in the M7, okay, as part of the in vivo, you know, test, you know, evaluating the, you know, the -- ultimately the, you know, the potential, you know, carcinogenic, you know, potential. Okay.

So -- yeah. So afterwards, you know, because from the process, as I said, based upon the nature of the process, you know, you just cannot control at such a low level. So we -- as I said, we revert to option one, okay.

So we have to prepare enough quantity and then, you know, send out for this comet assay. And the results of the comet assay cannot be negative. Okay.

And then I think in the beginning of this year we submitted, you

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know, this result to the FDA, okay? So this exactly, you know, how everything evolved or happened.

BY MR. SLATER:

Q. Coming back to my question, was it the FDA that directed ZHP to control impurities K and L as nitrosamine impurities?

A. I think I already explained it quite clearly. They gave us two options.

One option is to do in vivo animal studies. Okay. So basically what that means is if in vivo animal study cannot be negative, you know, they may, you know, accept our, you know, you know, argument that, you know, impurity K can be treated as a regular impurity, which is already or still being done, you know, based upon the policy from European regulatory agencies. Okay.

So the option two is if we, you know, is not able, like it was not able to do that, for whatever the reason, right, lack of resources or no CRO, for example, you know, you know, in China would do that kind of study, then we need to control impurity K and

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L as, you know, nitrosamine, like a default, you know, specification, which, as I mentioned, 26.5 nanogram per day.

Q. You said that number 2 indicated that impurity K and impurity L were required to be controlled in accordance with nitrosamine impurities. I'm simply asking was it the FDA that was requiring that.

MR. BALL: Objection. Asked and answered, and it mischaracterizes his earlier testimony.

A. Again, you know, this statement is taking, you know, you know, out of the context. Okay. In this particular case, probably in every cases, okay, you cannot taking, you know, your question out of the context. Okay. So I already repeated it twice, right?

So there's two options, okay. Only if we are not able to do the option one, then, you know, we will need to do the option two, which is to control that as nitrosamine default values. Okay. So, you know, so otherwise, you know, you are basically, you

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know, not saying, you know, you know, you know -- I mean, it would be very much misleading, okay?

BY MR. SLATER:

Q. The deficiency letter that's being addressed in row 5 was a deficiency letter from the FDA, correct?

A. It is for FDA, based upon our, you know, the amendment to submit our, you know, newly improved, you know, valsartan process.

And by the way, you know, by the way, this process has already been accepted by the European regulatory agencies. We already resume the supply of valsartan drug substances to the European market as well as to the Chinese market.

MR. SLATER: Let's take that document down, and the next document we'll go to which will be Exhibit 308, it will be PRINSTON00285416.

(Whereupon, Exhibit Number ZHP-308 was marked for identification.)

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BY MR. SLATER:

Q. On the screen we have Exhibit 307, which looks like it was -- has a fax date at the top of March 18, 2020.

MS. CALDERON: Adam, it's 308. I'm sorry to interrupt.

MR. SLATER: The exhibit number is 308?

BY MR. SLATER:

Q. Exhibit 308, which has a March 2020 fax stamp at the top, is a letter from the FDA to Huahai US as US agent for ZHP.

Do you see that?

A. Yes, I see that.

Q. And it --

MR. SLATER: Scroll down, please, Cheryll.

Q. This indicates, "Dear Sir: This communication is in reference to your Type II Drug Master File for Valsartan USP (Process II)."

And I want to stop there. What is Valsartan Process II?

A. Process II, I think it is -- by

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this time it should have been the zinc chloride process.

MR. SLATER: Let's go to the second page, please, paragraph number 5.

Q. This states, "In the January 21, 2020 amendment you stated in 3.2.S.2.2 that impurities K and L were negative in the Ames assay and that these could be controlled as 'any single impurity' at NMT 0.10 percent in the drug substance. Please note that our clinical group has stated that Ames assays may not fully characterize the mutagenicity of N-nitroso compounds due to species-specific differences in metabolic activation of potential mutagens."

Do you see what I just read?

A. Yeah, mm-hmm.

Q. The letter continues, "These N-nitroso compounds are identified as part of the 'cohort of concern' for potent carcinogenic effects, therefore additional caution and a more robust characterization of

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their mutagenic potential is warranted. We recommend the following regarding the nitroso valsartan and nitroso valsartan methyl ester impurities in valsartan drug substance," and then there's two --

A. Two options.

Q. -- two options indicated.

Do you see that?

A. Oh yeah. Yeah. That's exactly what I said, two options.

Q. Number one says, "Reduce Impurities K and L in your drug substance to levels that are below the reporting threshold of 0.03 parts per million."

Do you see that?

A. Mm-hmm.

Q. And the second option is to "characterize each impurity in an in vivo gene mutation assay," and then it describes that.

Do you see that?

A. Oh, yeah, sure.

Q. At no time did the FDA or any regulatory agency tell ZHP that it could

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treat NDMA or NDEA as -- I need to rephrase the question.

At no time did the FDA permit ZHP to treat NDMA as anything other than a nitrosamine impurity once the FDA became aware of it, correct?

A. We're talking about here, you know, impurity K and L. I mean, now you're switch, you're talking about NDMA.

Q. Okay. I asked -- do you want me to reask my question?

A. Sure.

Q. At any time did the FDA tell ZHP that it did not have to control NDMA as a nitrosamine impurity?

A. No.

Q. At any time did the FDA tell ZHP that it did not have to control NDEA as a nitrosamine impurity?

A. No.

Q. The impurity that led to the recall of the zinc chloride process valsartan was NDMA, correct?

A. Yes.

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Q. The impurities that led to the -- well, withdrawn.

MR. SLATER: Okay. I think we finished that document. We'll take that down.

Cheryll, let's now go to ZHP00387118, please.

(Whereupon, Exhibit Number ZHP-309 was marked for identification.)

BY MR. SLATER:

Q. On the screen we have what we've now marked as Exhibit -- gosh, I should know what I'm talking about before I start talking about the exhibit.

On the exhibit -- rephrase.

On the screen is Exhibit 309, which is a scientific literature article.

Do you see that?

A. Yeah, mm-hmm.

Q. And it's titled, excuse my pronunciations, "Development of Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry Methods for Analysis of DNA

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Adducts of Formaldehyde and Their Application to Rats Treated with NDMA or 4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone," and it says that it was a 2007 publication.

Do you see that?

A. Yes.

Q. And this article, I believe -- well, rephrase.

This is an article that you've read, correct?

A. I have not gone through this particular article.

Q. Are you sure about that?

A. Yeah, I'm pretty sure. I may have -- I don't know, I may have downloaded it, but I can tell you I just haven't gone through, you know, this particular article in details.

Q. Let's go through -- I actually didn't complete introducing the article so let me just make sure for the record I address it -- rephrase.

This article was written by --

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it looks like there's a handful of authors, just for the record their names are Mingyao Wang, Guang Cheng, Peter Villalta, and Stephen S. Hecht, and it looks like from the University of Minnesota Cancer Center.

Do you see that in front of you?

A. Oh, yeah, yeah. Yeah, could you maybe, you know, increase, you know, just a little bit? Yeah. Yeah, that's better. Thank you.

MR. SLATER: Let's go, if we could, Cheryll, to the second page of the article. I want to talk about a particular part of it.

I'm only going to use the left-hand column, so if it needs to be larger it's fine.

That's good. And you can just scroll up now. Perfect.

Q. Looking at the left-hand column at the top it says, "NDMA and NNK are representative N-nitroso methyl carcinogens. Beginning with the landmark studies of Magee,

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Dutton, Heath, and Druckrey nearly 50 years ago, well-established pathways of metabolic activation of nitrosamines involving cytochrome P450-mediated a-methyl hydroxylation have been described in the literature."

Do you see what I'm reading?

A. Mm-hmm.

Q. It says further, "As shown in Scheme 1, methyl hydroxylation of NDMA and NNK yields intermediates 5 and 9, which spontaneously release reactive diazohydroxides 6 and 10. These diazohydroxides or the corresponding diazonium ions react with DNA, producing adducts such as 06-methyl-dGuo from NDMA and 06-pyridyloxobutyl-dGuo (06-POB-dGuo) from NNK."

I want to stop there. This is talking about these nitrosamines reacting with and causing changes to DNA, correct?

A. Could we just scroll up a little bit? I just want to take a look at the, you know, the reaction scheme.

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Q. Yes.

A. Okay. So what is the question? I'm sorry.

Q. They're talking about these nitrosamines having an impact and reacting with and changing DNA, correct?

A. Yes. But it looks like, you know, as I said, this whole research was based upon animal studies. Yeah, so from the animal study at very high doses, looks like, you know, they isolated these DNA or -- yeah, you know, adducts. Yeah, that's what it says, it looks like.

MR. SLATER: Cheryll, please scroll back down to where we were so we can get to the -- perfect. Thank you.

Q. The article continues, "The roles" -- I just read that. Rephrase.

Actually, I didn't get there. Let me continue. New question.

Continuing now, it says, "The roles in carcinogenesis of these and related methyl- and pyridyloxobutyl DNA adducts of

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NDMA, NNK, and other N-nitroso compounds have been extensively studied," and I want to stop there.

And you would agree with me that there are a lot of studies talking about the fact that NDMA and NNK and other nitrosamine are carcinogenic, correct?

MR. BALL: Objection. Vague.

A. Based upon the statement here, it looks like, yeah, that's the case. But again, you know, based upon, you know, my knowledge, you know, as I said, of these studies, you know, they were based upon animal studies.

BY MR. SLATER:

Q. The last sentence of this section says, "In this paper, we present the first evidence that formaldehyde DNA adducts are formed in the lung and liver of rats treated with NDMA and NNK."

Do you see that?

A. Yes.

Q. So when they -- rephrase.

When they discuss treating rats

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with NDMA, they're talking about giving NDMA to these rats in order to intentionally cause them to develop cancer, correct?
MR. BALL: Objection. Vague, and mischaracterizes the document.
A. Looks like this is what it says.
BY MR. SLATER:
Q. And you know that NDMA has been used for many years, and it's well understood to give cancer to laboratory animals so they can then be studied, because it's so efficient at causing cancer, correct?
MR. BALL: Objection. Calls for expert testimony, foundation, vague.
A. As I indicated, or as I answered before, animal study, you know, at a very high dose, you know, it issues carcinogenic to the animals.
BY MR. SLATER:
Q. It's accepted in the scientific community that NDMA very efficiently causes cancer in laboratory animals when scientists

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want to study the cancer in those laboratory animals, correct?
MR. BALL: Objection. Calls for expert testimony, testimony foundation, vague.
A. Based upon the description in this particular paragraph, or in particular the last sentences, it didn't say that, you know. It just said the first evidence formaldehyde NDMA -- I'm sorry -- formaldehyde DNA adducts are formed in the livers of rats treated with NDMA and NNK. So it didn't say anything else.
MR. SLATER: Let's go now to the page where the Bates number is 123, the last three digits, please. It's the "Discussion" left-hand column on that page. I just want to bring up the discussion there. Perfect. Thank you.
BY MR. SLATER:
Q. Here now in the "Discussion" part of this article, which was provided to us by ZHP from ZHP's own files, it states

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that first "The results of this study provide the first evidence for the presence of formaldehyde DNA adducts in laboratory animals."
Do you see that?
A. Uh-huh, sure.
Q. If we go down a little further in that paragraph, about halfway down it says, "The method was applied to rats treated with the carcinogenic nitrosamines NDMA and NNK, and the results demonstrate for the first time that formaldehyde DNA adducts are produced from these carcinogens, in addition to the well-characterized adducts, which result from diazohydroxides formed in nitrosamine metabolism."
Do you see that?
A. Yes. Let me read it through again.
(Witness reviewing document.)
A. Okay, yeah.
Q. When this refers to NDMA as a carcinogenic nitrosamine, that means from a scientific perspective that it's a

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nitrosamine that causes cancer, correct?
MR. BALL: Objection. Vague, calls for expert testimony, mischaracterizes the document.
A. I mean, again, as I, you know, answered previously, it's carcinogenic to animal -- you know, laboratory animals, and it's, you know, it's a probable carcinogenic to humans.
BY MR. SLATER:
Q. You said "it's a probable carcinogenic to humans"? That's the last part you said?
A. Yes.
MR. SLATER: Okay. We can take this document down now. Just give me a second. I'll find the next one hopefully. There it is.
Cheryll, let's go now to the 2013 ICH Consensus Guideline, please. Thank you.
(Whereupon, Exhibit Number ZHP-310 was marked for identification.)

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MR. SLATER: Sorry, I'm having trouble with my binder clip here. I feel like I have to get my binder clips in place before I can move to the next thing.

MR. BALL: I have the same problem from time to time. I hate when they flip off of everything and go all over my office.

MR. SLATER: Yep, they squeeze off and they fly all over.

MR. BALL: Yep, exactly.

BY MR. SLATER:

Q. Looking now at this exhibit, which is --

MR. SLATER: Is this 310? Gosh, am I ever right about the exhibit number?

MS. CALDERON: No. But it's 310, yes.

MR. SLATER: That's a suspect response.

MS. CALDERON: You were right this time.

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Q. Do you see Exhibit 310 in front of you?

A. Yes, I do.

Q. And you've mentioned the ICH guidelines during the course of the deposition, and this is the one --

MR. SLATER: If you could scroll up a little, Cheryll.

Q. It will show that it was dated February 6, 2013.

Do you see that?

A. Mm-hmm.

Q. The title of this document is "Assessment and Control of DNA Reactive (Mutagenic) Impurities in Pharmaceuticals to Limit Potential Carcinogenic Risk." And it says then "M7."

Do you see that?

A. Mm-hmm.

Q. Just to be clear on the title and the purpose of this document is to prevent human beings from developing cancers as a result of pharmaceutical drugs, correct?

MR. BALL: Objection.

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Foundation.

A. It's already, you know, stated very clear, right? It's for the purpose to limit the potential carcinogenic risk.

BY MR. SLATER:

Q. It's to limit the potential carcinogenic risk for human beings ingesting pharmaceutical products, correct?

A. Yes.

Q. More specifically, it's seeking to limit that potential carcinogenic risk as a result of DNA reactive or mutagenic impurities in those pharmaceutical products, correct?

MR. BALL: Objection. Foundation.

A. Based upon this title, yes.

MR. SLATER: Let's go, if we could, Cheryll, to page 2, please. There's a heading number 3 that says "General Principles." You just -- there you go.

BY MR. SLATER:

Q. Looking at heading 3 titled

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"General Principles," the first sentence says, "The focus of this guideline is on DNA reactive substances that have a potential to directly cause DNA damage when present at low levels leading to mutations and therefore, potentially causing cancer."

So that's giving some overview of what the purpose of this standard is, correct?

A. Mm-hmm.

Q. Going to the second paragraph, it starts out, "A Threshold of Toxicological Concern (TTC) concept was developed to define an acceptable intake for any unstudied chemical that will not pose a risk of carcinogenicity or other toxic effects."

Do you see that?

A. Mm-hmm.

Q. So the threshold of toxicological concern is, according to this document, applicable to a certain class of pharmaceutical products, correct?

A. Looks like.

MR. SLATER: Cheryll, could you

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scroll down a little bit so we can get that -- perfect. Thank you.

Q. At the end of that paragraph it says, "Some structural groups were identified to be of such high potency that intakes even below the TTC would theoretically be associated with a potential for a significant carcinogenic risk. This group of high potency mutagenic carcinogens ('cohort of concern') comprises aflatoxin-like, N-nitroso-, and azoxy-compounds." Correct?

A. Yes.

Q. And the N-nitroso compounds include NDMA, correct?

A. Yes.

Q. And N-nitroso compounds include NDEA, correct?

A. Yes.

MR. SLATER: Cheryll, could you go to page 5, please? Thank you. You can scroll up a little bit more. No, the other way. That should do it.

Q. Section 5.2 is titled "Degradants," or Degradants. How would you

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pronounce that?

A. Usually pronounce it degradant.

Q. Okay. I'll go with your pronunciation.

Section 5.2 is titled "Degradants." And if we go down to the second to last paragraph in that section it says, "Knowledge of relevant degradation pathways can be used to help guide decisions on the selection of potential degradation products to be evaluated for mutagenicity, e.g., from degradation chemistry principles, relevant stress testing studies, and development stability studies."

I want to stop there and first ask you what is -- what is a degradation pathway? What does that mean?

A. Well, basically how a drug -- you know, a drug substance will decompose, you know, to form, you know, maybe sometimes, you know, first through an intermediate and then to its final product. So basically it's just a pathway, you know, or sometimes you may call it a mechanism, a degradation

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mechanism.

Q. A degradation pathway can also include decomposition of an ingredient in a manufacturing process -- well, rephrase.

A degradation pathway can also -- well, rephrase.

Degradation can also refer to decomposition yielding impurity, correct?

A. To be precise --

MR. BALL: Objection. Asked and answered.

A. Sorry, yeah.

To be precise, the degradants that we discuss here or the document discuss here is typically related to after the making of a drug substance, okay. So once you have, you know, the final isolated pure drug substances that have met the -- your registered specifications, right, so from that point, okay, you will perform the stability study, okay.

So based upon that, you know, you will examine whether that particular drug substance will decompose to give a number of,

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you know, degradation products.

Or the same thing is true, you know, once you formulate that already made, you know, that drug substance into a finished product, right, and so you're making a finished or dosage form. So the degradants or the degradation product, you know, examination start from that point once you make that product.

So during the process something will decompose, but, you know, it's -- it's basically outside the scope of, you know, of what this document is talking about. I would believe, you know, when we're talking about, you know, drug degradation is, you know, is the -- these two scenarios that I just, you know, described.

BY MR. SLATER:

Q. Looking at the paragraph -- rephrase.

Looking at the first paragraph under the heading "5.2. Degradants," the second sentence says, "Actual drug product degradation products include those observed

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above the ICH Q3B reporting threshold during storage of the drug product in the proposed long-term storage conditions and primary and secondary packaging."

That's what you were just talking about, right?

A. Yes.

Q. That's after the product has been manufactured and is now going to be stored and then it's going to be, I would assume, shipped and packaged, etcetera, right?

A. Exactly.

Q. This says that the actual drug product degradation products also include those impurities that arise during the manufacture of the drug product, correct?

A. Let's see. Well, right here, yeah, that's what it says.

Q. And coming back now to the paragraph second from the bottom of this section, when it talks about "Knowledge of relevant degradation pathways can be used to help guide decisions on the selection of

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potential degradation products to be evaluated for mutagenicity," that's talking about an assessment that's made to evaluate potential risks, so you want to look for those potential products of the degradation process, correct?

MR. BALL: Objection.

A. Yes.

Sorry.

BY MR. SLATER:

Q. And that's something that's evaluated when a risk assessment is performed on a manufacturing process, correct?

A. Right.

Q. And it talks about, in performing that assessment, looking at degradation chemistry principles, and that would be looking at the science, right, looking at the actual science of how these substances may degrade, correct?

A. Yes, look at the science and also the knowledge, yeah, knowledge being, yeah, derived from science and, you know, known to, you know, a specific group of the

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communities like the process chemists.

Q. For example, in the manufacture of pharmaceutical drug substances such as valsartan, process chemists are part of that process to risk assess and evaluate based on science what are the potential degradation products of that manufacturing process, right?

A. Yes.

Q. And it's required that that risk assessment be thorough and scientifically based, for example, in scientific literature, correct?

MR. BALL: Objection. Foundation, calls for a legal conclusion.

A. To the scope, to the scope, you know, because to the best knowledge of the process science, you know, chemists, you know, at that time.

BY MR. SLATER:

Q. All right. We're going to come back to this, but I want to go through a couple things first.

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MR. SLATER: So the next thing I'd like to do, Cheryll, is go to the next document, which I guess is Exhibit 311, which is the 1996 textbook Purification of Laboratory Chemicals, please.

(Whereupon, Exhibit Number ZHP-311 was marked for identification.)

MR. SLATER: And this will be Exhibit 311. Thank you.

BY MR. SLATER:

Q. Looking at Exhibit 311, this is a textbook titled Purification of Laboratory Chemicals.

Do you see that?

A. Mm-hmm.

Q. And on the next page we can see that the date of publication was 1996.

Do you see that?

A. Mm-hmm.

Q. And then it says it was reprinted multiple times, 1997, 1998, 1999, and 2000, correct?

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A. Mm-hmm.
MR. SLATER: Cheryll, let's now scroll down to page 192, please. Down to the bottom of the page, the last paragraph, please. Perfect.
Q. I'm looking now at page 192, you can see that there's an entry for "N,N-dimethylformamide," and then in parentheses "DMF."
Do you see that?
A. Mm-hmm.
Q. And DMF was one of the solvents used as part of the zinc chloride process, correct?
A. Yes.
Q. And this indicates in this textbook that DMF "Decomposes slightly at its normal boiling point to give small amounts of dimethylamine and carbon monoxide."
Do you see that?
A. Okay.
Q. And it says, "The decomposition is catalyzed by acidic or basic materials, so that even at room temperature DMF is

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appreciably decomposed if allowed to stand for several hours with solid KOH, NaOH or CaH2."
Do you see that?
A. Mm-hmm.
Q. And you would agree with me that from the perspective of the chemistry community, the potential decomposition of DMF was something that was known and was known by mainstream chemists, correct?
MR. BALL: Objection. Calls for speculation, expert testimony.
A. You know, this description did not give specifics, okay. It's kind of a -- and also, you know, here it says, you know, if it's allowed, you know, to be in contact with solid, you know, KOH, sodium chloride, you know, you know, calcium hydride, these are all very strong, you know, you know, base.
BY MR. SLATER:
Q. It was understood, and this -- we saw the dates before, that this was in print between 1996 and 2000, this textbook,

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at least this version as of the time that this -- rephrase.
A. Mm-hmm.
Q. This textbook documents scientific knowledge as of the late 1990s and 2000 that DMF decomposes slightly at its normal boiling point to give small amounts of dimethylamine and carbon monoxide. That's what's stated in that first sentence, correct?
A. Mm-hmm.
MR. BALL: Objection. Objection. Mischaracterizes the document, calls for expert testimony, and vague.
MR. SLATER: One second, I just want to get that down.
MR. BALL: And calls for speculation.
MR. SLATER: You said mischaracterizes the document, vague, speculation.
MR. BALL: And expert testimony.

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MR. SLATER: Expert testimony.
BY MR. SLATER:
Q. That's what that sentence says, correct?
A. That's what sentence says, yes.
Q. And in terms of scientific knowledge, as of the late 1990s and 2000s, it was known that DMF could decompose to give off small amounts of dimethylamine, correct?
MR. BALL: Objection. Calls for expert testimony, and speculation.
A. So there is, yeah, this description here, I mean, obviously. But, you know, based upon my understanding, you know, at the time of 2011 and 2012, you know, there is no, like, patterns or specific literatures indicating, you know, you know, you know, valsartan process chemistry utilizing DMF or, you know, slight amount of the impurity of DMF would -- you know, would cause an issue.
So the bottom line is, you know, there was a knowledge gap, you know, you know, at the time, and so...

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Another thing is that basically, you know, everything, you know, can decompose to certain, you know, degree, right, particularly, you know, under some -- you know, by in contact with very strong base, you know, like, for example, here.

So when it's encountered with this, you know, you know, you know, strong base, you know, this would not be, you know, relevant with the zinc chloride process.

So that process during that tetrazole formation, you know, you know, you know, particular step during the reaction, it did not use such a strong acid -- I'm sorry, base, you know, KOH or, you know, sodium hydride or whatever.

BY MR. SLATER:

Q. You said something -- well, rephrase.

As part of the risk assessment, the scientific analysis of the process required that the potential decomposition of DMF would be taken into account in the risk assessment for the zinc chloride process,

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correct?

A. Well, what I'm just saying is that at the time of this process development, it appears, you know, this minor decomposition did not fall into the knowledge base, you know, during that particular time period.

Q. When you say "didn't fall into the knowledge base," you mean didn't fall into the knowledge base of the people at ZHP performing the risk assessment, correct?

A. It's not only the ZHP, you know, because I believe that, you know, you know, this particular process is also utilized, you know, by other, you know, companies.

And also I would utilize -- you know, I would like to point out, you know, some other companies, they use, you know, the same zinc chloride process, but instead of utilizing, you know, DMF, you know, they use another nitrogen-containing solvent, which is NMP, you know, I guess we have discussed NMP yesterday, you know, as like, you know, an

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alternative sample diluent for the test base GMS.

So for that process, similar things happen, right, I mean retrospectively. And so for the similar process, if you utilize NMP, then, you know, retrospectively now we know that NMP would also -- you know, during that process will decompose slightly, and then during the quenching it would form, you know, the other N-nitroso, you know, compound. I think it's called an NMBA.

So, you know, basically, you know, you know, it -- you know, now retrospectively, you know, looking at the -- you know, this issue and certainly these minor decomposition of the solvent, you know, did not fall into the knowledge base, you know, of all of these process chemists.

Q. When you said this information about DMF decomposition to give off dimethylamine was not within the knowledge base specific to valsartan manufactured by ZHP with the zinc chloride process, you were referring to the knowledge base of ZHP,

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correct?

A. What I'm saying is it's not only ZHP. You know, anyone utilizing, you know, the same or similar process, you know, they had the same issue, now looking back.

And also, you know, you know, you know, in our process as well as, you know, other, you know, you know, companies' process, they have all been submitted, you know, numerous times, you know, to the regulatory agencies, you know, you know, different countries.

So prior to, you know, June 2018, you know, all of those, you know, process chemists, you know, after, you know, their regulatory review, they all get approved, you know, during that period.

So basically, you know, I would say, you know, it's fair to say, like, you know, from FDA's, you know, you know, some of the document says, you know, during that time period the industry as well as regulators, you know, had a knowledge gap.

Q. Certainly in the chemistry

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community it was known that DMF could decompose, give off small amounts of dimethylamine, and that this could happen either in acidic or basic environments, correct?

That's what it says right there, right?

MR. BALL: Hold on. Objection. Vague, calls for speculation, and calls for expert testimony.

A. You know, basically, again, you know, as I said, here it says, you know, in context with a, you know, strong base, it will -- you know, it will decompose.

A lot of things, you know, a lot of organic solvents, you know, if you treat it with strong base, you know, it would decompose. And, you know, it's all based upon, you know, the context.

BY MR. SLATER:

Q. This says that the decomposition of DMF is catalyzed by acidic or basic materials, and you agree with me it can happen due to acidic or basic materials,

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correct?

MR. BALL: Objection. Mischaracterizes his earlier testimony, and mischaracterizes the document.

A. The sentence just says quite, you know, vaguely, just said, you know, by acidic or basic, right.

So it gives examples, specific examples of base, but here it didn't give specific examples of acids, right? I don't see any acids being mentioned here.

BY MR. SLATER:

Q. Our jumping-off point to this was the requirement under the ICH standard to apply degradation chemistry principles in order to perform a risk assessment. And since ZHP was going to use DMF in the zinc chloride process, they needed to do that analysis with regard to DMF, correct?

A. You know, at the time of the process development, okay, DMF was considered to be a very stable solvent, okay? And as a matter of fact, you know, DMF is still, you

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know, from a process chemistry perspective in general, is still a very stable solvent. It all depends upon, you know, a particular combination of -- you know, of different facts, right?

So with regard to the zinc chloride, you know, you know, process, either utilizing the DMF or like other company utilizing, you know, NMP, only when you, you know, in that specific, you know, you know, particular combination, now we know retrospectively, you know, that very tiny or low amount of decomposition would cause, you know, this problem. But otherwise, you know, it still would be fine.

I mean, like our, you know, newly, you know, improved process, right? Once we, you know, found the root cause and then we do the separate quenching, so we still using DMF right now.

And, you know, as I indicated, you know, yesterday, our valsartan now have, you know, undetectable, you know, level of NDMA. You know, the detection limit is only

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5 ppb, which is, you know, 60 times lower than the current FDA's requirement, which is 300 ppb.

Q. What is CaH2?

A. Oh, that's calcium hydride.

Q. Is that an acid?

A. No, that's a base. That's a very strong base.

Q. What is NaOH?

A. Sodium hydrochloride. Yeah, that's a very basic, you know, you know, you know, base. Yeah.

I mean, I guess if somebody -- I mean, like when I first learned chemistry, sodium, you know, hydrochloride is probably the first base that I learned.

Q. Coming back to my question, in -- rephrase.

In performing its risk assessment, ZHP was required to evaluate by applying degradation chemistry principles to the potential degradation of DMF since it was going to be used in the zinc chloride process, correct?

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MR. BALL: Objection. Vague, and asked and answered.

A. Based upon -- you know, based upon what I know, okay, the original, you know, you know, process chemist, okay, they considered or they utilized this degradation -- you know, you know, you know, considering the degradation chemistry.

But the minor degradation of DMF, it was just not falling to, you know, the knowledge base. Not only with ZHP, as I indicated; also with other companies utilize the same or similar process.

So what that's supposed to mean is that during that particular time period, you know, within the process chemist, you know, you know, circle, this was not a concern, or this knowledge, you know, was not there.

So that's what I meant, you know. There was a knowledge gap, you know, as indicated by, you know, some of those FDA's training material.

BY MR. SLATER:

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Q. There was no knowledge gap regarding the potential decomposition of DMF to give off dimethylamine. That was something that was known, and I'm showing you a mainstream textbook that says it. That was no secret, right?

MR. BALL: Objection. Argumentative, speculative, and mischaracterizes his testimony.

A. Look, chemistry as well as all of the other sciences, I mean, it's -- you know, it has enormous details in terms of the knowledge, okay. And now, you know, we looking back, you know, the critical thing is that, you know, someone, or a group of people or regulators, you know, you know, need to connecting those dots, they scattered, you know, you know, here and there. Otherwise, you know, yeah, I mean these piece of knowledge, you know, could be here and there, right.

I mean, when we, you know, come up with a solution or finding, you know, people, you know, very often can go back and

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then now realize, you know, oh, yeah, if you were to connecting these dots, you know, together at the time, you know, you may, you know, you know, avoid, you know, that issue.

But, you know, but that's also, you know, part of the, you know, knowledge base, right. Not only we talking about the individual pieces knowledge here and there, you know, also you need to, you know, making -- you know, you know, connecting the dots.

So that's another level, you know, of the knowledge. And, you know, so that's what I, you know, meant, you know, specifically with regard to this issue, you know. It is -- nobody, you know, throughout industry as well as the regulator, you know, at the time, you know, were able to connecting all the dots.

BY MR. SLATER:

Q. And my questions are specific to the people who worked at ZHP when the zinc chloride process was being developed. Those people who were in charge of that process

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needed to perform a risk assessment that included evaluating the potential decomposition of DMF as part of that process, it's something that had to be considered, correct?

A. As I told you, you know, also if you look at some of the FDA's, you know, you know, released documents, you need to have that knowledge, or you need to have the knowledge, you know, to connecting, you know, those dots, you know, otherwise, you know, you would have a knowledge gap.

Once you had that knowledge gap, you -- you know, it will not lead you to that direction. But as I said, in general during the, you know, process development, ZHP's, you know, process chemists look at the, you know, the degradation issues.

But as I said, you know, due to the knowledge gap, it just didn't lead them, you know, to this particular issue.

Q. Did you just say that ZHP's process chemists looked at the degradation issues as part of the process change?

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A. Well, based upon, you know, you know, you know, maybe some of the documents, it's probably there. But although I, you know, didn't have time, you know, you know, you know, to go through them in very -- you know, in full details.
Q. You have no idea if that was looked at, right?
A. I had some idea, but I said I -- you know, I'm not a process chemist, you know, so it's better to be answered by a process chemist.
Q. Well, with regard to the root cause investigation which would have included evaluating how this happened, did you see anything indicating that anybody at ZHP considered the potential decomposition of the DMF to yield dimethylamine as part of the process? Did you see anything indicating that anybody thought about that at all at ZHP?
A. Basically as I already said, you know, due to the knowledge gap this particular issue was not considered.

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Q. And that knowledge gap would include a lack of research in either textbooks or published literature, in the scientific literature, to evaluate potential decomposition of DMF? It wasn't researched at all, correct?
MR. BALL: Objection. Foundation, speculation.
Go ahead and answer if you can.
A. Yeah, I think that's -- that's a speculation. You know, that process was developed very early on, you know. I was not there, I am not a process chemist, so I cannot speculate.
BY MR. SLATER:
Q. You've seen nothing indicating that anybody at ZHP made any effort to look at any scientific literature or publications at all to evaluate potential decomposition of DMF, you've seen nothing indicating anyone looked at that, correct?
MR. BALL: Objection. Compound.
Go ahead and answer if you can.

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A. As I said, I cannot answer that question, because I was not there, you know, I'm not a process chemist.
BY MR. SLATER:
Q. In your role as a 30(b)(6) --
MR. BALL: Hold on, hold on. Either you've seen it or you haven't seen it.
A. I haven't seen it, yeah.
MR. BALL: Yeah, that's fine.
BY MR. SLATER:
Q. And coming back to the ICH guideline, evaluation of the degradation chemistry principles would have required an evaluation of scientific literature or publications to try to answer that question, right?
MR. BALL: Objection. Mischaracterizes the guideline.
A. Yeah, the guideline has that information. Yeah.
MR. SLATER: Let's take this exhibit down and go to Exhibit 197.
MR. BALL: Why don't we take --

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we've gone about an hour 15 since our last break --
MR. SLATER: We can take this down and take a break now.
MR. BALL: Okay.
MR. SLATER: Take this down, and let's go off the record.
MR. BALL: Okay. Great. Thanks.
THE VIDEOGRAPHER: The time right now is 9:46 a.m. We're now off the record.
(Whereupon, a recess was taken.)
THE VIDEOGRAPHER: The time right now is 10:04 a.m. We're back on the record.
BY MR. SLATER:
Q. On the screen we have Exhibit 197, which is an article that was published in scientific literature in 2009 titled "N,N-Dimethylformamide: much more than a solvent."
Do you see that?

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A. Mm-hmm.
MR. SLATER: Let's go, if we could, to page 8315, the right-hand column, 3. Excellent.
Q. Heading Number 3 says, "Source of carbon monoxide," and then it says, "DMF decomposes slightly at its boiling point to afford dimethylamine and carbon monoxide, this reaction occurring even at room temperature in the presence of some acidic or basic materials. This observation has led to the use of DMF as a carbonylating agent."
Do you see that?
A. Yes.
Q. So this is another example of an article in the published literature setting forth that DMF could potentially decompose and yield dimethylamine, correct?
A. This looks like exactly the same wording, I mean the first one that I'm seeing, right, in that first reference.
So may I take a look at the reference 32? I just want to make sure what this reference is.

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Q. Sure. I think you're probably right, actually.
A. 32. Yeah, Purification of Laboratory Chemicals, 19 -- well, it's 1966. Okay, yeah, that's -- looks like that's the same one, yes.
MR. SLATER: Let's stay on that page, Cheryll.
Q. So reference 32 is to the textbook that we were talking about a moment ago, Exhibit 311, except this is a citation to the version of that textbook published in 1966, correct?
A. Looks like, yes, mm-hmm. It looks like the first version, right?
Q. I don't know.
A. Probably, yeah.
Q. So this article is showing that a textbook actually talked about the decomposition of DMF to yield dimethylamine going back as far as 1966, correct?
A. Yes.
MR. SLATER: Let's take that down now, and then go to Exhibit 211.

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Q. Exhibit 2 -- rephrase.
Exhibit 211 is an article that was published in 2010 in the Journal of Physical Chemistry, and the title is "Theoretical Investigation of N-Nitrosodimethylamine Formation from Nitrosation of Triethylamine."
Do you see that?
A. Mm-hmm.
Q. And it looks like this was submitted in 2009 and published in 2010, correct?
A. Yes.
Q. And the people who published this article, it looks like Zhi Sun, Yong Dong Liu, and Ru Gang Zhong from the College of Life Science & Bioengineering, Beijing University of Technology in Beijing, correct?
A. Yes.
Q. So this article was actually published by some people in China, correct?
A. Mm-hmm, looks like, yes.
Q. Let's go down now a little bit in the Introduction, and looking at the

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second paragraph it says -- please, yeah.
Looking at the second paragraph under the Introduction, it says in part, "Because dialkylnitrosamines are of great interest in carcinogenesis, much attention has been focused on their formation mechanism, especially from secondary amines."
Do you see that?
A. Mm-hmm.
Q. Is dimethylamine a secondary amine?
A. Yes.
Q. "Consequently, NDMA is generally believed to be formed from the reactions of dimethylamine (DMA) and nitrosating agents, such as N2O3, N204, and ONCl."
Then it begins, "In addition to secondary amines, however, a wide variety of tertiary amines have also been demonstrated to react with nitrous acid to produce N-nitrosamines in aqueous solution."
A. Okay.
Q. This is talking about the

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process whereby a nitrosating agent such as, for example, nitrous acid would be a nitrosating agent, correct?
A. Yes.
Q. Can react with diethylamine to create NDMA, correct?
A. Mm-hmm.
Q. And that's actually what happened with the zinc chloride process to create the NDMA, correct?
A. Yeah, retrospectively we know that's the case.
Q. Certainly you would agree with me that in performing the risk assessment at the outset with the zinc chloride process, the process chemists at ZHP would have known through degradation chemistry principles and the principles here in this article that NDMA could form if they had gone through literature, as we just did, correct?
MR. BALL: Objection.
Speculative.
A. I mean, this is basically, you know, the same kind of question, I mean, you

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already asked before.
You know, so my answer, you know, I already, you know, gave to you is that, you know, due to, you know, the knowledge gap, you know, at the time, right?
And also I indicate the knowledge gap is not only, you know, piece of, you know, a particular knowledge, also a lot of times you have to connecting, you know, the thoughts together.
So, you know, like, as I said, again, like FDA's -- you know, some of those training materials, you know, they indicate at the time industry and also regulator, you know, had that knowledge gap.
BY MR. SLATER:
Q. This article, as we just went through a moment ago, was actually written by and submitted by people in China in 2009, correct?
A. Yeah, looks like. Yeah, mm-hmm.
Q. There was nothing -- well, rephrase.

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The idea that dimethylamine and nitrous acid could react to form NDMA, that was something that a process chemist working at a pharmaceutical company would be expected to know as of 2011, correct?
MR. BALL: Objection.
Speculative, and calls for expert testimony.
A. As I said, it's only, you know, when somebody connecting the dots together, you know, linking those two things together.
First of all, you know, the minor decomposition of DMF would give small amount of dimethylamine.
Second of all, you know, you have to also link, you know, its reaction with the nitrous acid. So it's basically, you know, you know, you need, or someone at the time, you know, need to connecting the dots, right?
I mean, a lot of things, you know, looking retrospectively it may become, you know, much more obvious. But at the time, as I indicated before, you know, the

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minor decomposition of DMF, it was just not, you know, you know, falling into the knowledge base.
BY MR. SLATER:
Q. If ZHP's process team -- rephrase.
If the people at ZHP had performed a proper risk assessment and actually looked at the scientific literature, this article was there to be found in 2011, correct?
A. Again, as I indicated, you know, chemistry is a vast, you know, you know, you know -- as a science contains vast, you know, you know, knowledge base.
And as I indicated also, you know, a lot of things looking back, you know, you know, people would then start to connecting all the dots. So the knowledge base is not only, you know, you know, the individual pieces, you know. Also somebody at some time or at the right time need to connecting those dots.
So another thing is, as I

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indicated before, you know, not only, you know, ZHP, but also other company utilizing, you know, the same or similar, you know, you know, a certain process, a similar case being -- you know, utilizing NMP as the reaction solvent.

You know, those processes, they were all commercialized. They were all previously submitted to various regulatory agencies, including European agencies, you know, the FDAs.

And so at the time, you know, again, you know, at these agencies, you know, there are, you know, great numbers of capable, you know, scientists.

So, you know, it appears now retrospectively it also did not -- you know, you know, I mean, they obviously also, you know, seem to have, you know, the knowledge gap particularly, you know, connecting the dots.

Q. When you refer to "connecting the dots" -- rephrase.

A risk assessment requires a

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scientific analysis to connect the dots. That's the point of a risk assessment, to do a thorough scientific analysis and connect the dots, correct?

A. The thorough scientific evaluation would be limited at any given time, okay, to a particular, you know, set of knowledge.

I mean, you know, you basically just, you know, cannot, you know, you know, go through, you know, every single details. I mean, it's just not practical, you know.

Unless -- unless, like, if something happened, you know, for example like these particular events, right? Now everybody, you know, you know, start to connecting the dots, and then, you know, regulatory agencies, you know, also require every company to do, you know, you know, you know, you know, the risk assessment, particularly with regard to the nitrosamine, you know, you know, potential risk, right.

And then, you know, now we see more and more, you know, you know, different

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commercialized drugs, you know, you know, you know, being -- having the issue of NDMA, right.

As I mentioned yesterday, we have seen issues for NDMA in, you know, ranitidine, you know, and as I said that, you know, ranitidine has become a commercialized product, I think as early as 1981.

And, you know, you know, these companies, you know, you know, this particular product, you know, it was developed by, you know, this very well-known, you know, GlaxoSmithKline in the company.

And also during the course of this very long history, we also see other companies, you know, including Sanofi, you know, which is, you know, also another very famous, you know, France-based multinational pharmaceutical company, right, they also manufacture, you know, you know, you know, ranitidine for quite a few years.

You know, I'm sure, you know, their scientists as well as, you know, the early, you know, you know, GSK or, you know,

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French, you know, SmithKline at the time, they all did a, you know, risk assessment based on the best knowledge at that time.

But still, you know, this issue remained, you know, unknown until, you know, these particular events become known, you know, to, you know, everybody.

Q. Am I correct that the only company that was selling ZHP valsartan API -- rephrase.

Am I -- rephrase.

ZHP was selling its zinc chloride process valsartan -- rephrase.

ZHP developed the zinc chloride process in order to sell zinc chloride process valsartan for profit by ZHP. That was the purpose of that, correct?

MR. BALL: Objection. Outside the scope.

A. Again, you know, first of all, you know, I'm not a process chemist, okay, but if you want to ask, you know, my personal, you know, you know, perspective, you know, I might give you one, okay?

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Every -- first of all, every commercial process, you know, you need to consider costs, right? Result in effective costs, you know, we would have had a lot of issues, right?

And the reason, you know, you know -- I mean, the United States has the best, you know, generic drug company or industry, you know, you know, in the world, you know. That has bring down, you know, you know, the cost to the patients, you know, tremendously.

So, you know, controlling costs, you know, you know, is something every company, you know, whether, you know, it's a generic drug company or a multinational pharmaceutical company, you know, everybody, you know, you know, doing that, right.

And also by controlling costs a company would also, you know, share, you know, those savings, you know, with patients, right?

So -- and another thing is, you know, the fundamental, you know, criteria is

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that you need to, you know, you know, at the same time you're controlling the costs, you need to also develop a product, right, which is comparable -- you know, like during the process change, you know, which is comparable to the previous, you know, product. So based upon my limited knowledge, you know, at the time of the process development during that evaluation.

So the overall quality, you know, of this zinc chloride process was comparable, you know, to the previous ones.

MR. SLATER: Cheryll, let's go to Exhibit 213, please. 213.

MR. BALL: Adam, can we go off for just one second while I go ask the people out in the hall to be a little bit more quiet?

MR. SLATER: Sure.

MR. BALL: Thank you. I'll be right back.

MR. SLATER: Let's go off the record.

THE VIDEOGRAPHER: The time

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right now is 10:23 a.m. We're now off the record.

(Pause.)

THE VIDEOGRAPHER: The time right now is 10:23 a.m. We're back on the record.

BY MR. SLATER:

Q. We're back in Exhibit 213, the November 29, 2018 warning letter from the FDA.

MR. SLATER: Cheryll, would you go to page 4 of that document, please? Middle of the page, please, a little further down. Okay.

Q. This is the FDA's commentary on this subject we've been discussing, and it says, "You also failed to evaluate the need for additional analytical methods to ensure that unanticipated impurities were appropriately detected and controlled in your valsartan API before you approved the process change."

So I'm going to stop there. They're talking about the risk assessment

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process, correct?

A. Let me see.

MR. BALL: Objection. Calls for speculation.

A. It looks like so, mm-hmm.

BY MR. SLATER:

Q. Then the FDA says, "You are responsible for developing and using suitable methods to detect impurities when developing, and making changes, to your manufacturing processes. If new or higher levels of impurities are detected, you should fully evaluate the impurities and take action to ensure the drug is safe for patients."

You agree with what the FDA said in terms of what the obligations of ZHP were? That's an accurate statement, correct?

MR. BALL: Objection. Calls for a legal conclusion.

A. The last sentence -- sorry, yeah.

The last sentence said, "If new or higher level of impurity are detected." But this was not the case with NDMA, because

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as I indicated, you know, the residual solvent method is not capable to detect NDMA.
BY MR. SLATER:
Q. GC-MS was capable of detecting and identifying NDMA if you thought about it and looked for it, right?
A. The GC --
MR. BALL: Hold on, hold on.
Objection. Calls for expert testimony, argumentative, and mischaracterizes his testimony.
Go ahead.
A. I think I, you know, answered it yesterday. The GC-MS method are based upon the ZHP's GC-FID method, okay, is still not, you know, you know, as -- is -- it's still not adequately to detect NDMA as -- you know, as a suitable, you know, analytical control method.
BY MR. SLATER:
Q. If ZHP had been looking for NDMA or any nitrosamines with GC-MS -- well, I'll withdraw that.
The problem ultimate -- well,

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actually I want to withdraw that and actually go back to my question.
You agree with me that ZHP was responsible during the process change to develop and use suitable methods to detect impurities when developing and making changes to the manufacturing process, correct?
MR. BALL: Objection.
Mischaracterizes his earlier testimony.
A. You know, as I -- as I said, I already answered this question before, you know, because there is, you know, like FDA, you know, you know, the statement says, you know, it said if new or higher level of impurity are detected.
But as I said, you know, the GC-FID method, which is the residual solvent method and also is a registered, you know, method, okay, it just not capable, you know, detecting NDMA.
As far as, you know, you know, go back to the, you know, the very same, you know, point, you know, right, basically, you

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know, I said during the time of the process change, you know, no one, you know, the industry, also the regulatory agencies, you know, you know, had that knowledge gap.
You know, if at the time, you know, people already knew, like today, yeah, everybody will go that extra mile and -- to, you know, look for it. But, you know, that was just not the case during that time.
BY MR. SLATER:
Q. Looking now at the third full paragraph on page 4 of this FDA warning letter of November 29, 2018, the FDA stated, "Your response states that predicting NDMA formation during the valsartan manufacturing process required an extra dimension over current industry practice, and that your process development study was adequate. We disagree. We remind you that common industry practice may not always be consistent with cGMP requirements and that you are responsible for the quality of drugs you produce."
Do you see that?

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A. Yeah, I see that, mm-hmm.
Q. And you understand that ZHP at all times was required to comply with cGMP requirements with regard to its process for manufacturing its valsartan that it was going to sell. You agree with that, correct?
MR. BALL: Objection. Calls for a legal conclusion.
A. To me it's very obvious, you know, this whole paragraph is a retrospective, you know, statement. So going back to that, you know, period, you know, we -- as I said, you know, we did all what we can do, and we filed to the various regulatory agencies like everybody else. And this process, you know, was approved by multiple, you know, regulatory agencies, including the FDA.
And also, as I said, you know, I indicated that, you know, in some of the most recently released FDA training material, you know, FDA, you know, basically acknowledged, you know, the knowledge gap during the previous time by both industry as

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well as regulators.
BY MR. SLATER:
Q. So is it ZHP's position that other companies or regulatory agencies are at fault for letting ZHP manufacture valsartan with the zinc chloride process and not adequately evaluate and realize that NDMA could be produced? Are you saying it's someone else's fault and it's not ZHP's responsibility?
MR. BALL: Objection. Foundation, mischaracterizes his earlier testimony.
A. It's clearly not what I said before. Okay. What I'm saying or what I have been saying is during that particular time the industry as well as the regulatory agency had that knowledge gap. Okay. And also, you know, science, you know, is making progress all the time.
BY MR. SLATER:
Q. Are you -- rephrase.
Speaking for ZHP right now, is ZHP saying ZHP is not responsible for its

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failure to adequately assess the risks, but somebody else is responsible for ZHP's failures?
A. Again --
MR. BALL: Objection. Mischaracterizes his testimony.
A. Again, you know, this is not what I'm saying, okay.
BY MR. SLATER:
Q. Well, who's responsible for the inadequate risk assessment? Is it ZHP, or is it someone else?
MR. BALL: Objection. Foundation and compound.
A. When FDA says, you know, there was a knowledge gap at the time for both industry as well as for the regulatory agencies, you tell me who would be responsible.
BY MR. SLATER:
Q. If you look at this letter from the FDA in November of 2018, the last part of that paragraph we've been talking about says, "You are responsible for the quality of drugs

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you produce."
You agree with that statement, correct?
MR. BALL: Objection. Calls for a legal conclusion.
Go ahead.
A. Yes. Everybody, or every manufacturer will be responsible to the extent, you know, you know, with their best efforts at the time.
BY MR. SLATER:
Q. And ZHP is -- rephrase.
ZHP is also responsible for its failure to disclose to the FDA in 2017 when it knew at the latest -- rephrase. Let me -- let me reask the question.
And ZHP as of July 2017 at the latest, when it knew that NDMA had been produced as part of the zinc chloride process and was an impurity in its valsartan, at that point ZHP had a responsibility to tell the FDA, right?
MR. BALL: Objection. Foundation, calls for a legal

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conclusion.
A. I think I -- you know, as I told you before, at the time it was, you know, it was a guess, you know, by a single, you know, chemist.
BY MR. SLATER:
Q. That single chemist was Jinsheng Lin who worked for you, right?
A. He was in my department, yes.
Q. He's still in your department, right?
A. He still is, yes.
Q. Did Jinsheng Lin tell you -- rephrase.
Did -- rephrase.
Did Jinsheng Lin show you the chromatograms that he used to identify the NDMA in the valsartan?
MR. BALL: Objection. Foundation.
A. As I told you, you know, in that e-mail clearly, you know, he's just making a -- you know, a guess or, you know, a projection, you know.

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BY MR. SLATER:
Q. Well, actually, what he said in that e-mail was that NDMA occurs in valsartan when it's quenched with sodium nitrite, which was an accurate statement. It was scientifically accurate, correct?
MR. BALL: Objection. Vague, and mischaracterizes the document.
A. As I said, again, you know, this was his projection.
MR. SLATER: Cheryl, let's go, if we could, to that other document you started to pull up. I don't remember what it was previously marked as, if you could tell us. The establishment inspection report.
MS. CALDERON: I don't think it was previously marked.
MR. SLATER: Oh, really? Well, we can mark it again. What are we up to? I'm not the guy to know that answer.
(Whereupon, Exhibit Number ZHP-312 was marked for

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identification.)
BY MR. SLATER:
Q. Looking at Exhibit 312, this is the July 23, 2018 Establishment Inspection Report.
You're familiar with this document, right?
A. I probably at least read through this, yeah.
MR. SLATER: Let's go, if we could, to page 25, Cheryl, 25 of 58. The Bates number, the last two digits are 73. Perfect.
Q. You mentioned earlier that the process change to zinc chloride took into account cost. Remember you were telling me that earlier?
MR. BALL: Objection. Mischaracterizes his earlier testimony.
A. You mean, you know, why, you know, a new process like zinc chloride process was developed, right?
///

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BY MR. SLATER:
Q. Didn't you tell me earlier that one of the benefits -- well, rephrase.
Didn't you tell me earlier you have to take into account the cost?
A. Oh, yeah, yeah. Yeah, every process, you know, development, yeah, cost, you know, is a factor to be, you know, to be considered.
But also that I mentioned, you know, very clearly, you know, that the fundamental, you know, you know, you know, factor that need to be considered is, you know, the product produced by the new process need to be comparable with regard to the registered specifications.
Q. Well, let's look at -- rephrase.
Looking at the middle paragraph on this page, there is a statement in the middle after the second line -- rephrase.
Looking at the center -- rephrase.
Looking at the paragraph in the

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middle of the page, the second sentence says, "Mr. Jun Du, Executive Vice President, apologized and stated the change control should have stated the purpose of the change was to save money."
A. I'm sorry. Where it is?
Q. Sure.
Let's do this. Looking at the carryover paragraph at the top of the page, you can see that it's discussing, about four lines from the bottom, the "Valsartan Process II Zinc Chloride Process Change Summary."
Do you see that?
A. Wait a second.
So basically it's the first paragraph, right?
Q. Right. Four lines from the bottom of that paragraph.
A. Four lines from the bottom. One, two... Four lines. One, two, three... I don't see "Mr. Jun Du" here.
Q. No. Now I'm on a different paragraph. I'm leading into it now. So let

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me as you this.
If you look at the first paragraph --
A. Oh. Oh, actually, I'm sorry. Actually I see in the second paragraph, okay. Second paragraph, yeah, "Mr. Jun Du, Executive Vice President, apologized and stated that the change control should have stated the purpose" of change -- "should have stated the purpose was to save money."
I don't know -- I don't know, you know, you know, what that's supposed to mean. Maybe --
MR. BALL: He hasn't asked you a question yet.
Go ahead, Adam.
BY MR. SLATER:
Q. In this Establishment Inspection Report, you can see at the first paragraph it's discussing the zinc chloride process change.
Do you see that?
A. You mean the very first paragraph, right?

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Q. Right. The first paragraph, four lines from the bottom of the first paragraph, it's discussing the zinc chloride process change.
Do you see that?
A. Hold on. So four line from the bottom of the first paragraph.
And also, yeah, going above, like, Mr. Dong pointed out a table describing, right, manufacturing process for valsartan API.
"Mr. Dong pointed to a table describing manufacturing operating ranges in Valsartan Process II Zinc Chloride Process Change Summary."
And then, "The table does not include an acceptance criteria. I asked Mr. Dong if the firm established specific parameters with acceptance criteria which the firm used to evaluate if the isomer conversion was reduced and the yield increased...again pointed to the same table."
Okay. Yeah, so there's some, yeah, discussion with Mr. Peng Dong, yes.

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Okay.
Q. In the first paragraph, we can see the process change to the zinc chloride process is being discussed, correct?
A. You're basically again talking about the first paragraph?
Q. Right. It's discussing the zinc chloride process change, correct?
A. Yes. So far the very first line of the first paragraph, right, okay? It says, okay, "Change Request...did not identify specific parameters the firm would use to evaluate the effectiveness of the requested change and the impact of the requested change on intermediates and/or the final valsartan API prior to implementing change..."
So it's talk about particularly change request here.
Q. And then in the second paragraph on this page, in the second line it says that "Mr. Jun Du, Executive Vice President, apologized and stated the change control should have stated the purpose of the

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change was to save money. Mr. Du further stated the cost reduction was so significant it is what made it possible for the firm to dominate the world market share."
Do you see what I just read?
A. I don't know what -- you know, you know, what he actually said --
MR. BALL: That's a yes-or-no question, did you see what he read.
A. Well, what is -- yeah, what is showing here, yeah, it is. But, you know, as far as whether Mr. Du, you know, actually said that or, I don't know, maybe that's a translational error. I really cannot tell. I mean, you know, it would be best, you know, to verify with Mr. Jun Du.
BY MR. SLATER:
Q. Do you see what I just read?
A. Yeah, I saw what you read, yeah.
Q. And with regard to the subject of cost and the cost in connection with the process change, in fact, as stated by Mr. Du, who is one of the top executives in the

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company, this cost reduction from the zinc chloride process allowed ZHP to dominate the world market share for valsartan. That's what, according to this document from the FDA, is what he told the FDA, correct?

MR. BALL: Objection. Hearsay, outside the scope.

A. Yeah, I think it's outside my scope. I mean, this is, you know, purely -- you know, I'm a technical person, so, you know, best again, you know, check with him and make sure, you know, or whether he really said that or really he meant that, you know. It could have been, you know, there's some misunderstanding.

BY MR. SLATER:

Q. And, in fact, the reason why you and the others who received that e-mail in July 2017 from Jinsheng Lin did nothing in response to that, knowing that NDMA was developing in the valsartan, was because the valsartan was doing so well in the market that you didn't want to disrupt that, correct?

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MR. BALL: Objection. Foundation, mischaracterizes his earlier testimony, and outside the scope.

A. I would say that's your speculation.

BY MR. SLATER:

Q. And then in April 2018, when you directed your team not to complete the report that had been written since July of 2017 because of the sensitive impurity, that was because you understood that that would disrupt the marketing of the product which was very profitable to ZHP, and you didn't want to get in the way of that by disclosing the NDMA impurity, correct?

MR. BALL: Objection. Foundation, mischaracterizes his earlier testimony.

A. What you said really, you know, twisted, you know, you know, the fact, okay. Like I said yesterday, that particular impurity is not NDMA, okay. That particular impurity, you know, was the N-nitroso

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derivative of irbesartan.

And also, again, that impurity was only present, you know, during the, you know, process, you know, you know, you know, trial tried to overcome some of the safety, you know, you know, concern, right.

So as I indicated before, you know, that impurity was not a real impurity in a, you know, real commercial batch, and so -- and also I indicated to you, you know, you know, the work has been done at the time, you know, the report was already there, you know. I didn't say, you know, you know -- you know, I mean, you can see, you know, you know, from such a long period of time, you know, you know, that work has been, you know, you know, has been ongoing.

You know, as I explained yesterday, you know, the reason, you know, I advised him not to issue is try to avoid confusion, you know.

BY MR. SLATER:

Q. Your testimony is now that you told Mr. Lin not to issue that report was to

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avoid confusion, when last night you told me that you didn't even remember it ever happening. Have you suddenly remembered?

A. Well, I --

MR. BALL: Objection. Mischaracterizes his earlier testimony, and argumentative.

A. Yeah, I mean, I think what I said yesterday is, first of all, I just said, you know, you know, I don't remember, you know, you know, you know, whether, you know, you know, I don't remember the details of that conversation, okay?

Second -- second point is I said retrospectively, you know, you know, if I want to give you a reasonable explanation, you know, that's -- you know, that could be, you know, the most likely reason, okay.

BY MR. SLATER:

Q. So do you remember the Jinsheng Lin e-mail and then directing your team not to issue the report?

A. I don't remember --

MR. BALL: Hold on.

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Objection. Vague, compound, foundation.
Go ahead.
A. I don't remember, you know, you know, that particular e-mail, as I said, because, you know, you know, I receive, you know, a lot of e-mail every day, and, you know -- so I, you know, basically completely slipped through.
But with regard to that conversation, you know, you know, I already provide you, you know, the explanation.
BY MR. SLATER:
Q. Well, is your explanation based on what you remember, or is your explanation something that you're just coming up with now because you don't remember?
MR. BALL: Objection. Argumentative. And compound.
A. I think, you know, I, you know, I've been quite clear, you know, yesterday and also just moments ago. You know, as I said, first of all, with regard to that conversation, I do not remember the details

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of the conversation, okay, and then I'm trying to provide a reasonable explanations.
BY MR. SLATER:
Q. When you say you tried to provide reasonable explanations, are you making up these explanations, or are these actually the facts of what you recall happened?
MR. BALL: Objection. Argumentative, and compound, and mischaracterizes his testimony.
A. So, you know, basically, you know, as I said, you know, I just try to, you know, because I do not remember the details, so as I said this would be a likely, you know, reason, okay?
BY MR. SLATER:
Q. We talked last night about the fact that we can't find that report. Can you tell me any more than you told me last night about where we might find that report that you told your team not to issue in April of 2018? Because we'd really like to read it.
MR. BALL: Objection.

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Mischaracterizes his testimony.
Go ahead and answer if you can.
A. The report should be somewhere, but I don't know exactly, you know, or at least, you know, at that time, but I don't know what would have happened, you know, to it now.
BY MR. SLATER:
Q. Well, it should be in your custodial file because it was provided to you to read and decide what you wanted to do with it, and after you reviewed it you said not to issue it. So actually we should have gotten it from your custodial file, right?
MR. BALL: Objection. Speculative, and foundation.
A. I really don't know whether it should be there or not. I mean --
BY MR. SLATER:
Q. Well, when somebody sends you a completed report to approve, you then have it in your e-mails and you have it on your computer, it should be there if somebody produces everything that's on there that's

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relevant, right?
MR. BALL: Objection. Speculative.
A. I mean, at a certain point, you know, it's possible, you know, yeah, he sent that, you know, he might e-mail me, it's possible. And also it's possible, you know, he might just bring a hard copy.
But as I said, you know, I just have no memory, you know, on the detail, what exactly happened.
BY MR. SLATER:
Q. Did you speak to anybody today other than your lawyers --
A. No.
Q. Let me just ask you.
Did you speak to anybody today other than your lawyers --
A. Today --
Q. You've got to let me finish the question.
MR. BALL: Min, let him finish, okay?
THE WITNESS: Okay. Sure.

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Mm-hmm.
BY MR. SLATER:
Q. Did you speak to anybody today other than your lawyers about this deposition or anything that you testified to or were asked about yesterday?
A. No.
Q. When your computer was -- rephase.
I just want to be very clear. Do you recall your computer actually being collected so that information on the computer could be taken down and provided to us as part of this litigation? Do you recall that actually happening?
A. Oh, yeah, mm-hmm.
Q. Do you have hard copy documents in your office?
A. No.
MR. BALL: Objection. Vague.
BY MR. SLATER:
Q. Well, you just told me that Mr. Lin might have brought you the report as a hard copy, so I assume from that that

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sometimes people provided you hard copy documents. Did I misunderstand?
MR. BALL: Objection. Mischaracterizes his testimony.
A. But I don't keep that, you know, hard copy. He might -- okay. He may -- he might or he might not. But, you know, hypothetically, you know, if he, you know, bring a hard copy for discussion usually, you know, I don't keep them. Otherwise, you know, I'll be, you know, you know, overwhelmed, you know. I don't like to have too many, you know, you know, hard copy, you know, because it's also waste of resources.
BY MR. SLATER:
Q. You have some paper documents in your office; you're not saying you have none, are you?
A. I have some, yeah, like company, you know, you know, policies, you know, for some of the company policy. For example, like travel policies, you know, it's just for easy references.

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Q. As part of the root cause investigation conducted by ZHP, did ZHP review the July 27, 2017 e-mail that we talked about and we've been discussing for Mr. Lin? Did -- was that looked at as part of ZHP's root cause investigation?
A. You mean was that, or was his e-mail being looked at it?
Q. Right. Was that looked at as part of the root cause investigation conducted by ZHP?
A. I mean, as I told you, you know, yesterday, you know, you know, it basically -- you know, that e-mail didn't, you know, you know, generate any resonance.
MR. BALL: Min, that's a yes or no question. Did you -- was it -- did anybody look at it as part of the root cause analysis?
A. No.
BY MR. SLATER:
Q. Did anybody speak to Mr. Lin as part of the root cause analysis -- root -- let me rephrase it.

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Did anybody speak to Jinsheng Lin as part of the root cause investigation?
A. I have no idea.
Q. Certainly Mr. Lin should have that report on his computer, right?
MR. BALL: Objection. Speculation.
A. He may, you know, right now, may or may not. I really don't know.
BY MR. SLATER:
Q. Somebody should have that report on their computer, right?
MR. BALL: Objection. Speculation.
BY MR. SLATER:
Q. It should exist somewhere within -- it should -- rephrase.
That report should exist somewhere within ZHP, right?
MR. BALL: Objection. Speculation and argumentative and compound.
A. A more accurate statement would be, you know, it most likely this document

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may be present in the computer, you know, at a certain point of time. But as far as its current status, I really, you know, have no -- I do not have that knowledge.
BY MR. SLATER:
Q. Well, does ZHP have that knowledge?
MR. BALL: Objection. Speculation.
BY MR. SLATER:
Q. Remember, you're speaking for ZHP, so I'm asking --
MR. BALL: No, I understand, Adam, I didn't tell him not to answer.
MR. SLATER: No, no. I was going to rephrase the question to make it clearer.
BY MR. SLATER:
Q. Speaking for ZHP, that report should exist somewhere, right --
MR. BALL: Objection.
BY MR. SLATER:
Q. -- in the company, and be able to be produced to us, right?

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MR. BALL: Objection. Speculation.
A. You know, as I said, you know, at this point, you know, I just cannot answer that question.
BY MR. SLATER:
Q. Why can't you answer that question?
A. Because, you know, anything can happen between then and now.
Q. What do you mean by that, "anything can happen"?
A. You know, it just could be deleted or, you know, you know, for whatever the reason, if it's, you know, saved somewhere at some point.
MR. SLATER: Cheryll, let's go to Exhibit 209, please.
MR. BALL: Adam, did we lose Cheryll? There we go. Okay.
MR. SLATER: I don't think we would lose her. She would just say, You know what? It's late enough, I've had it with you people, and I'm moving on. Wouldn't be the first time she's done that to me.
MS. CALDERON: Won't be the last.
MR. SLATER: Excellent. I hope you got that on the record.
MR. BALL: Yeah, we're still on the record.
MR. SLATER: Good, good.
BY MR. SLATER:
Q. Looking now at ZHP-209 -- rephrase.
Looking now at Exhibit 209, this is an "IARC Monograph on the Evaluation of the Carcinogenic Risk of Chemicals to Humans."
MR. SLATER: And if you could scroll up a little more, Cheryll, please.
Q. It's addressing some N-nitroso compounds.
Do you see that?
A. Mm-hmm.
MR. SLATER: And just to --

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scroll up again to be sure that we're clear on timing. I just want to get to the very bottom of the page to get to the date.
Q. And the date on this document is May 1978.
Do you see that?
A. Mm-hmm.
Q. You know what IARC is, right?
A. Oh, yes.
Q. It's the International Agency for Research on Cancer, a respected organization, correct?
A. Oh, yes.
MR. BALL: Objection. Speculation.
BY MR. SLATER:
Q. Speaking for ZHP with regard to -- rephrase.
Speaking for ZHP, the IARC is certainly a respected organization, correct?
A. Yes.
MR. SLATER: Let's look now at page 36, and I want to look at the

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third paragraph.
Q. The third -- rephrase.
The third paragraph on page 36 starts out, "It has been known since 1865 that the reaction of dimethylamine hydrochloride with sodium nitrite at an acidic pH yields" N-nitro sodium methylene" -- I'm going to start over.
The third paragraph on page 36 starts out stating, "It has been known since 1865 that the reaction of dimethylamine hydrochloride with sodium nitrite at an acidic pH yields NDMA."
Do you see that?
A. Yes.
Q. And, again, that's describing what happened in the zinc chloride process, correct?
MR. BALL: Objection. Foundation.
A. This -- you know, I think the correct way to say is, you know, the zinc chloride, you know, retrospectively again, the zinc chloride process for the formation

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of NDMA, you know, was also under the acidic, you know, pH.
So, yes, so from that perspective, yeah, they are consistent.
BY MR. SLATER:
Q. And this is an IARC monograph from 1978. It's certainly something that scientists would be aware of and have available to them if they wanted to consult it, correct?
A. Yes.
MR. BALL: Objection. Speculative, and calls for expert testimony.
BY MR. SLATER:
Q. And it would have been available to be reviewed in 2011 certainly, right, since it's dated in 1978, correct?
A. I'm sorry, what?
MR. BALL: Go ahead, answer.
THE WITNESS: Okay.
Yeah, basically, you know, if there is a particular, you know, you know, reason, you know, at the time,

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yeah, someone will, you know, you know, going and trying to find this document.
MR. SLATER: Let's go, Cheryll, to page 40, please. Thank you.
BY MR. SLATER:
Q. Looking at page 40, the first full paragraph, the second sentence starts out, "The principal techniques employed for the analysis of volatile N-nitrosamines have been described in a recent publication," and it gives a citation from 1978.
Do you see that?
A. Right.
MR. BALL: Hold on. Adam, I don't see it. Where are you?
MR. SLATER: I'm in the paragraph --
MR. BALL: Oh, I see it. I'm sorry. I'm sorry. I was looking farther down.
MR. SLATER: No problem.
BY MR. SLATER:
Q. The paragraph continues, "The

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relative merits of high- and low-resolution mass spectrometry are discussed, since use of mass spectrometry as a confirmatory technique is particularly important."
Do you see what I just read?
A. Yes.
Q. And certainly it was well-known, at least as of 1978 when this IARC monograph was published, that mass spectrometry was an important confirmatory technique to identify nitrosamines such as NDMA, correct?
MR. BALL: Objection. Speculative, and calls for expert testimony.
A. This description itself is very vague, okay. Between, you know, that time and now, you know, mass spectrometry has made quite, you know, a significant progress.
So without knowing, you know, the detail what this particular, you know, you know, sentence is referring, you know, it's very difficult, you know, you know, to assess, you know.

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I mean, one thing I would say, you know, based upon, you know, such a low level, right, now these, you know, you know, like 30 ppb, you know, or sometimes even lower, I would say that the technology or the mass spectrometry, you know, during that time would not be adequate to analyze or detect at such a low level, you know, as we see or need to, you know, test today.

Q. You would agree with me that at least as of 1978 when this IARC monograph was published, it was known that mass spectrometry was an important confirmatory technique to identify nitrosamines such as NDMA, correct?

MR. BALL: Objection. Calls for expert testimony.

A. Here it just said, yeah, the principal technique, yeah, for the analysis of volatile N-nitrosamine.

(Cross-talking.)

BY MR. SLATER.

Q. That would include NDMA, correct?

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MR. BALL: You both were talking at the same time. I didn't hear the question. I'm sorry.

A. So, Adam, could you repeat the -- you know, the question, right, Rick wanted to hear, right?

BY MR. SLATER:

Q. When this talks about volatile N-nitrosamines, that would include NDMA, correct?

A. Yes.

MR. SLATER: All right. Let's take this document down, and we're going to switch to another document.

So I don't know -- I lost track of time, so you tell me.

MR. BALL: We're at three hours and 26 minutes, so we can -- it's really up to you, Adam. We've got about an hour six since the last break.

MR. SLATER: All right. Let's keep going. I'm fine --

MR. BALL: Do you think you can

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finish your next document in like the last -- the next 15 minutes, or do we want to take a break now, or --

MR. SLATER: I don't think I'm going to finish this in the next 15 minutes. I've got a lot of interaction documents here.

MR. BALL: Okay. So why don't we take a break, you can get yourself set up and then, you know, if we need to take another break we can, if we don't we won't, okay?

MR. SLATER: That sounds good. All right. So let's take ten.

THE VIDEOGRAPHER: The time right now is 11:07 a.m. We're now off the record.

(Whereupon, a recess was taken.)

THE VIDEOGRAPHER: The time right now is 11:22 a.m. We're back on the record.

BY MR. SLATER:

Q. Looking now at -- rephrase.

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Going back to the ICH Guideline, M7 from 2013, we're now looking at Section 7.2.1 titled "Mutagenic Impurities With Positive Carcinogenicity Data (Class 1 in Table 1)." And for these -- rephrase, I'm going to start over.

MR. SLATER: Let me just check something. I might want to go to a different page.

You know what, let's go to page 10, to the top of the page. Great. I'll start over.

Q. We're back -- rephrase.

Looking at the ICH guideline from 2013, we're now on page 10. At the top of page 10 it states, "A disproportionately high number of members of some structural classes of mutagens, i.e. aflatoxin-like-, N-nitroso-, and azoxy structures, of which some may occur as impurities in pharmaceuticals, display extremely high carcinogenic potency. Acceptable intakes for these high-potency carcinogens would likely be significantly lower than the acceptable

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intakes defined in this guideline."
Do you see what I just read?
A. Yes.
Q. And first of all, they're talking about these structures displaying extremely high carcinogenic potency. That would relate to the tendency to be able to increase your risk for or cause cancer, correct?
MR. BALL: Objection. Vague.
A. Specifically with regard to nitrosamine, so I think in previous, you know, you know, conversations, you know, I think I indicated the carcinogenicity, it is being discussed here, is referring to, you know, the result, or the data derived from animal studies.
BY MR. SLATER:
Q. When this refers to extremely high carcinogenic potency, that's talking about the ability to cause or increase the risk for cancer, correct?
MR. BALL: Objection. Vague.
A. Again, the risk, you know, to

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cancer with regard to N-nitrosamine, you know, is really related to or referring to, you know, you know, the -- in animals.
BY MR. SLATER:
Q. This standard is talking about impurities in pharmaceuticals. Those would be pharmaceuticals that would be taken by human beings, correct?
A. Yes.
Q. And with regard to humans taking pharmaceuticals, this is talking about certain impurities that display extremely high carcinogenic potency. That's the context, correct?
MR. BALL: Objection. Vague, calls for expert testimony.
A. With regard to that, you know, specific, you know, the three classes, yes.
BY MR. SLATER:
Q. And then when it says, "Acceptable intakes for these high-potency carcinogens would likely be significantly lower than the acceptable intakes defined in this guideline," this is talking about the

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need to evaluate the specific impurities and determine what would be the acceptable level for that impurity as opposed to using the threshold approach, correct?
MR. BALL: Objection. Foundation.
A. Yeah. I'm sorry. Yes.
BY MR. SLATER:
Q. And in this case, in 2018 the FDA actually established certain limits when this became known to them that there was NDMA in the valsartan, correct?
MR. BALL: Objection. Foundation.
A. Yeah, that was issued by FDA, yeah, in 2018.
BY MR. SLATER:
Q. And those limits for NDMA were 96 nanograms, which would equate to 0.3 parts per million, correct?
A. There was no such limit at that time. That limit was established only after, you know, the events of June 2018.
Q. In 2018, after the FDA was made

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aware that there was NDMA in the valsartan, the FDA established certain limits, correct?
A. Yes. And also I indicated yesterday at different time point, you know, you know, the limits also, you know, changes with time. From the very beginning of it should be absent, meaning for NDMA would be 5 ppb in terms of the limit of detection to the current, you know, 96-nanogram, which is equivalent to 300 ppb. So -- so you can see there is a 60 times of increase in terms of the allowable intake.
Q. The FDA established limits of 96 nanograms, which equates to 0.3 parts per million, correct?
A. Yes, for valsartan.
Q. For NDMA in valsartan, correct?
A. Versus its maximum dose, yes.
Q. And for NDEA, actually established limits of 26.5 nanograms or .083 parts per million, correct?
MR. BALL: Objection. Foundation.
A. Yeah, it looks like, yes.

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BY MR. SLATER:
Q. And these limits were set as -- rephrase.
These limits were set in order to protect patient safety, correct?
MR. BALL: Objection. Speculation.
A. As the title of --
MR. BALL: Calls for expert testimony.
Go ahead.
A. As the title of this M7 implies, you know, the purpose is limit of potential carcinogenic risk.
MR. SLATER: Cheryll, what I'd like to do now is pull up, if we could, Exhibit 42.
BY MR. SLATER:
Q. Page 42 is a document dated September 1st, 2018 titled "Response to DMF Information Request Letter."
Do you see that there?
A. Mm-hmm. Yep.
Q. What I'd like to now do is turn

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to page 8, if we could, please.
MR. SLATER: If you could, Cheryll, just scroll up a little bit more so we capture the top part of the page, and then we'll scroll down once we read the top. Thank you.
Q. Looking now on page 8 of this document, there was a request, you can see at the top, little letter "b.", "Provide a summary of the data for all lots tested to date for NDMA manufactured using the post-change process ('zinc chloride process'). Provide the corresponding GC chromatograms."
And the Response is that, "The summary of the data for all lots tested to date for NDMA manufactured using the post-change process (the zinc chloride process) are provided in Table 1."
Do you see that?
A. Mm-hmm, yes.
Q. And we just talked a little bit about the limits.
MR. SLATER: You can scroll up

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a little, Cheryll, so that we just show the table at this point. A little more. Thank you.
Q. We talked a few moments ago about the limits the FDA set, and for NDMA it was 0.3 parts per million. We talked about that, right?
A. Mm-hmm.
Q. And -- rephrase.
Looking now at Batch Number 1, which was manufactured on December 28, 2011, which was one of the validation batches, the NDMA result was 76 parts per million, correct?
MR. BALL: Objection. Foundation.
A. I'm sorry. Yes.
BY MR. SLATER:
Q. And I just did some simple math and divided 76 by .3 to try to figure out how many times the FDA limit that was, and I came to 253 times the FDA limit.
Does that sound right to you?
A. Probably, yeah.

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Q. And just randomly looking at this, going on the right-hand column, Batch 409 at 99.6, that's 332 times the FDA limit.
Do you see that?
MR. BALL: Adam, I don't see batch 409.
MR. SLATER: It's in the second column.
A. Right here, yeah.
MR. BALL: Oh, number 409, not batch 409. The batch number is -- okay. I misunderstood what you were pointing to, Adam.
MR. SLATER: No problem, no problem.
Cheryll, could you scroll down a little bit, please? Let's scroll a few pages down to page 11 of 33, to the top of that chart. You'll see it's -- you're going to see number 125 in the left and 517 in the middle. There you are.
Q. Looking now at the batch

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numbered 518, we have 188.1 parts per million, which if you divide that by .3, that's 627 times the limit set by the FDA, correct?
A. Yes.
Q. And we can go through this. My point being, this actually was through -- rephrase.
MR. SLATER: Cheryll, can you scroll to the end on page 16, just so we can establish the number of batches that were tested? Perfect.
Q. 783 batches. We can agree that all of these batches tested at numbers many, many times more than the limit the FDA ended up setting, correct?
MR. BALL: Objection. Vague.
A. They're all higher, yeah, than 0.3.
BY MR. SLATER:
Q. And in terms of the health and safety component, those levels certainly are -- rephrase.
In terms of health and safety

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for patients, those levels of NDMA are not acceptable from a health standpoint, correct?
MR. BALL: Objection. Calls for expert testimony.
A. As I indicated yesterday, in terms of the health risks, you know, it would be better suited, you know, to be answered by a toxicologist.
BY MR. SLATER:
Q. Well, speaking for ZHP, those levels are certainly not acceptable for sale, correct?
MR. BALL: Objection. Vague.
A. At the time of the -- you know, of the registration, you know, you know, prior to these events, you know, this particular specification was not there, you know, so all product met all the, you know, regulatory filed specifications. So this is really a retrospective analysis.
BY MR. SLATER:
Q. Well, let's talk retrospectively.
Retrospectively looking at

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these levels, it was never acceptable to be selling valsartan with these levels of NDMA, correct? From a health perspective from ZHP's view of the health risk?
MR. BALL: Objection. Speculative and compound, and calls for expert testimony.
BY MR. SLATER:
Q. I'll ask the question again. One second.
From ZHP's perspective, the health risk posed by these levels of NDMA was never acceptable, correct?
MR. BALL: Objection. Vague.
A. You know, again, you know, with potential risk to, you know, patients, again, this would be best answered by a toxicologist.
BY MR. SLATER:
Q. Well, I'm asking you, who is testifying for ZHP in this deposition on this topic, and you would agree with me on behalf of ZHP these levels would never have been and never were acceptable from a health

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perspective for the patients using medication, correct?
MR. BALL: Objection. Calls for expert testimony, vague.
A. Again, you know, it's not for -- you know, for me, you know, to, you know, give that evaluations.
BY MR. SLATER:
Q. Well, the FDA certainly has toxicologists on their staff, right?
A. Oh, yeah.
Q. And they determined these levels would not be acceptable from a health standpoint, correct?
MR. BALL: Objection. Speculative.
A. Retrospectively, based on the current knowledge, this is the case. Retrospectively, again.
BY MR. SLATER:
Q. And that unacceptable health risk is an unacceptable risk that somebody could develop cancer as a result of using this medication contaminated with NDMA at

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these levels, correct?
MR. BALL: Objection. Calls for expert testimony, compound, foundation.
A. As I indicated yesterday, you know, NDMA, you know, to human is a probable or potential carcinogenic. So whether, you know, these levels will cause cancer in humans is not confirmed.
BY MR. SLATER:
Q. Well, when you -- rephrase.
NDMA is considered a probable carcinogen, which means more likely than not it will cause or contribute to somebody at least having an increased risk to develop cancer. Can we agree to that without having to quantify the level of increased risk?
Can we agree to that statement?
MR. BALL: Objection. Calls for expert testimony.
A. There is no evidence, you know, you know, at this point, or there's no, you know, confirmed link, okay, between these levels, you know, of NDMA to the potential

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risk or to -- you know, to -- essentially, you know, it's a potential risk, okay. So a potential risk is not a confirmed link.
BY MR. SLATER:
Q. You would agree with me that the people who took the valsartan contaminated with NDMA have a higher risk to develop cancer than if they had not taken the valsartan contaminated with NDMA.
You would agree with that statement, correct?
MR. BALL: Objection. Outside the scope, and calls for expert testimony, and foundation.
A. Again, it's best to be answered by a toxicologist.
BY MR. SLATER:
Q. This is Topic 36. This is what you're designated to testify on. It's not expert testimony, it's not beyond the scope. It's ZHP's evaluation and knowledge of the health risks of this contamination with NDMA.
MR. BALL: Adam, I didn't instruct him not to answer.

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MR. SLATER: No, I understand, but what I'm --
MR. BALL: Adam, I've made my objection.
MR. SLATER: The problem is your witness continues to say he won't answer the question when he's designated to answer the question.
MR. BALL: No, no. I don't think it is that. I think it actually is outside the scope. But if you want to continue to ask him, feel free.
BY MR. SLATER:
Q. Based on ZHP's evaluation and knowledge of the health risks of the NDMA contamination of the valsartan, those people who took those pills have a higher risk to develop cancer than if they had not taken those pills.
You can agree to that, right?
MR. BALL: Objection. Mischaracterizes his testimony, foundation, and calls for expert testimony.

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A. This is what, you know, you said, okay? I didn't say that, okay. And from, you know, ZHP's perspective in terms of the health risk, right, all I can tell you based on my expertise, based on my understanding, is this is a potential risk to human, okay. Anything beyond that, you know, it's really not appropriate for me, you know, to comment.
BY MR. SLATER:
Q. Well, you're the only person designated on this topic, so you're the person I have to ask these questions of.
MR. BALL: Objection. Argumentative.
A. Yeah, you know, I give you answer, you know, you know. You know, my answer, you know, or, you know, by representing ZHP is at this point our, you know, you know, risk assessment, you know, based upon, you know, you know, you know, you know, the potential risk, you know, to human. You know, everything, you know, is out there, you know, as I said.

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At this point it's still a potential risk, okay. There is no established link, okay?

And also yesterday, you know, I gave you an example, right, a 40,000-plus, you know, patient taking ranitidine, you know, which is known now, you know, to give huge amount. You know, the level of NDMA actually, if you look at the paper, actually are much higher, you know, than these. And versus a group of control, you know, a group like more than 10,000, you know, patient taking famotidine, which is the same class of the medication, but would not decompose to give NDMA.

So, as I indicated, you know, this is from my, you know, limited, you know, understanding, you know, in this particular, you know, like a clinical side, right, you know.

To me this is very well-controlled, with large enough population to have a significant, you know, you know, meaningful, you know, results.

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You know, I -- and again, you know, this result, you know, indicated that there is no increased, you know, cancer risk to patients taking ranitidine versus, you know, the patient taking, you know, famotidine.

Q. You told me earlier that ZHP made the decision to stop selling its valsartan because of the levels of NDMA in the valsartan. That was for the benefit of patients, right?

MR. BALL: Objection. Mischaracterizes his earlier testimony.

A. Yeah, I think I already give the answer, you know, previously.

BY MR. SLATER:

Q. Well, let me ask you now.

When ZHP decided to stop selling -- rephrase.

As you said that -- rephrase.

When ZHP, as you said, decided to stop selling the valsartan contaminated with NDMA, that decision was made based on

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the health risk to patients, right?

MR. BALL: Objection. Mischaracterizes his earlier testimony.

A. I said based upon the potential risk to human, yeah, or to patient.

BY MR. SLATER:

Q. When you say due to the potential risk to patients, it was determined by ZHP that it was unacceptably dangerous for patients to take the pills contaminated with the NDMA, correct?

MR. BALL: Objection. Mischaracterizes his earlier testimony.

A. Again, this is what you're saying. Okay. This is not what I said. So I think I have answered numerous times, you know, yesterday as well as today.

BY MR. SLATER:

Q. Well, when you say that it was a potential risk, what you're saying is that it was too dangerous, otherwise you would have kept selling it, correct?

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MR. BALL: Objection. Mischaracterizes his testimony, and argumentative.

A. I think any -- anyone with a, you know, a reasonable, you know, understanding will not equal a potential risk, you know, to, like you said, a very dangerous. These -- these two are clearly, you know, you know, they are -- mean different things.

BY MR. SLATER:

Q. When you say a potential risk, it was an unacceptable risk in ZHP's viewpoint, and that's why ZHP stopped selling the valsartan, correct?

MR. BALL: Objection. Mischaracterizes his testimony.

A. Again, our decision was based upon the potential risk, you know, to patients.

BY MR. SLATER:

Q. And the decision that that potential risk was unacceptable, correct?

MR. BALL: Objection.

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Mischaracterizes his testimony, asked and answered.

A. I mean, I -- you know, if you want to keep asking the same question, you know, you know, I can give you the same answer.

You know, basically as I said, the decision was made based upon the potential risks to patients and which, you know, that potential risk is based upon, you know, the available scientific, you know, you know, documents available, you know, as of today.

MR. SLATER: Take this document down. And Cheryll, let's go to Exhibit 205, please.

BY MR. SLATER:

Q. This is the DMF amendment that was filed -- it's dated November 10, 2013 -- was filed in December of 2013.

Do you see that?

A. Yes.

Q. And this section 3.2.S.3.2 lists impurities, and there's a table of

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Potential Impurities in Valsartan.

Do you see that?

A. Oh, yeah, mm-hmm, sure.

MR. SLATER: And, Cheryll, if you could scroll down through that list of impurities, let's go through the lettered ones. Go to the last lettered one that we can get to. I think it's probably going to be J. There we go.

Q. In the list of impurities in this DMF, it goes up to impurity J. Impurity K, which we've discussed previously, was not listed, correct?

A. Based upon this table, it was not listed in there.

Q. And -- rephrase. And please -- well, rephrase.

And I think you've told us already that by this time ZHP knew that there was impurity K in the valsartan? Do I understand that correctly?

A. I have not saying, you know, specifically like by 2013, you know, we knew,

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you know, the presence of impurity K or whatever. So I think that this is a regulatory filing document, so I think my colleague from the regulatory affair, you know, will have a much better, you know, you know, answer to you.

Q. Well, the regulatory affairs people aren't the ones determining what impurities are in the substance, they seek that advice from people like yourself, right?

MR. BALL: Objection. Vague.

A. Well, basically, you know, they will, you know, get -- you know, confirm the results from R&D people, including, you know, my organizations.

But here, yeah, I clearly don't see impurity K. You know, the very reason at this point why it's not in there, you know, I just cannot tell you the details, because I don't know, you know, those details.

Only thing that I know is during the course, you know, at a certain point, you know, we became to know.

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BY MR. SLATER:

Q. You don't know when that was?

A. I would say it's -- looks like, you know, it's probably, you know, maybe after this one, you know.

Q. Do you have any idea when it was discovered or who discovered it?

MR. BALL: Objection. Vague.

MR. SLATER: All right. I'll ask it again.

BY MR. SLATER:

Q. Do you have any idea who identified impurity K, and when that occurred in the valsartan manufactured by ZHP?

A. I told you yesterday retrospectively that we knew it was, you know, it was, you know, discovered by the original innovator, you know, Novartis.

MR. SLATER: Let's scroll through, slowly through the end of the list of impurities, please.

Q. And please look at this because I'm going to ask you at the end --

MR. SLATER: Stop for one

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second, Cheryll.
Q. Tell me if you see any nitrosamines listed as potential impurities.
MR. SLATER: And you can continue scrolling.
Q. You would agree with me that no nitrosamines were listed as potential impurities for the zinc chloride process valsartan, correct?
A. Yes, in this file, yes.
MR. SLATER: Let's go, if we could, Cheryll, to page 364.
Q. Okay. Now we have -- rephrase.
Looking at page 364, there's a listing that says, "All the potential organic impurities are demonstrated in valsartan listed as follows." And you can see there's no impurity K and there's no nitrosamines, correct?
A. Yeah, looks like.
MR. SLATER: Cheryll, please scroll down now to the bottom part of this page.
Q. Okay. Looking now at the text

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underneath that table, it says, "Regarding the impurity D-J and hydrolysis product, there is not any high potency genotoxic group, such as, aflatoxin-like-, N-nitroso-, and azoxy-compound has been included in these impurities."
I want to stop there.
We know certainly in retrospect that, in fact, there was NDMA in the valsartan, correct?
A. Yes, retrospective.
Q. So this DMF was inaccurate when it said there were no N-nitroso compounds, correct?
A. It was based upon the knowledge at the time.
Q. It was incorrect at the time, correct?
A. As I said, retrospectively it turned out to be not accurate.
MR. SLATER: I think we can take that down. And the next document that we're going to go to is ZHP01567728. And I think you can put

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the English translation into the -- the link or whatever it is, Cheryll, if you could do that as well, please.
And then once it's there you all can let me know and I'll continue.
MS. CALDERON: Can I take -- can we take just a minute off the record? I just want to locate the English translation.
MR. SLATER: Sure.
THE VIDEOGRAPHER: Off the record, or timer?
MR. BALL: No, it's fine, we can go off the record.
THE VIDEOGRAPHER: Time right now is 11:54 a.m. We're now off the record.
(Pause.)
(Whereupon, Exhibit Number ZHP-313 was marked for identification.)
THE VIDEOGRAPHER: The time right now is 11:57 a.m. We're back on the record.

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MR. SLATER: Great. Thank you.
You know, Cheryll, scroll down a little bit just so we can see the whole bottom e-mail. Perfect. A little more actually. See if you can get -- no, too much. There you go.
BY MR. SLATER:
Q. Looking at Exhibit 313, it's an e-mail exchange in June 2018, June 16th.
Do you see that?
A. Yeah, mm-hmm.
Q. It looks like someone named Minfa Wang wrote to you on June 16, 2018.
Who is Minfa Wang?
A. She is the analytical head at Prinston Pharmaceuticals, which is a subsidiary of Huahai.
Q. And she wrote to you and said, "Attached paper is from web below." And then she quotes a link, and says, "It looks the potent is different between" -- and I assume that means potency -- "is different between nitrosamines and nitramines. Nitramine is less potent than that nitrosamine. Have been

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confirmed as nitrosamine?"
That's what she asked you, correct?
A. Yes.
Q. And you then -- let's scroll up now to your response.
And you confirmed -- "It is confirmed the impurity is NDMA," correct?
A. Yes.
MR. SLATER: Can we -- as Exhibit 314, let's put up the next document, which was the document that that link will take you to.
THE WITNESS: Right.
(Whereupon, Exhibit Number ZHP-314 was marked for identification.)
BY MR. SLATER:
Q. It's titled "Health effects of amines and derivatives associated with CO2 capture: Nitrosamines and nitramines."
And it looks like it was an analysis or study that was carried out by the Norwegian Institute of Public Health,

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correct?
A. I don't remember, you know, you know, at the time, you know, when I probably clicked the link, and so I don't remember exactly who published it. But if you say, you know, that's Norwegian -- oh yeah. Here's the Norwegian. Yeah, I saw that. Okay, yeah.
MR. SLATER: Let's go now to the next page, please, to Section 2, paragraph 2. Perfect.
Q. Looking now at paragraph 2, titled "Evaluation of cancer risk from exposure to nitrosamines."
Do you see that?
A. Oh, yeah, mm-hmm.
Q. And this says, "Nitrosamines represent a large and diverse family of synthetic and naturally occurring compounds. Approximately 90 percent of the 300 nitrosamines tested have shown carcinogenic effects in bioassays and laboratory animals. Among these, NDMA has been most thoroughly studied. NDMA has been shown to be a potent

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mutagen and carcinogen." And it cites an NIPH report from 2009, which would be the same organization, Norwegian Institute of Public Health.
It then says, "Due to their potent carcinogenicity, other health outcomes of these compounds have been given less emphasis and are therefore less well documented."
So that would have been some information that would have been available to you when Minfa Wang wrote to you in June 2018?
A. Yeah.
MR. SLATER: Let me just check something.
Okay. We're done with that document.
At this point I'm going to wrap up for the night.
MR. BALL: Okay. Adam, we've gone like four hours tonight. I just -- I want to make sure you understand we're not going to add time

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on to the last day.
MR. SLATER: You know what, I don't want to argue with you, but it's fine.
THE VIDEOGRAPHER: Do you want that off the record?
MR. BALL: Yeah, yeah.
MR. SLATER: It's fine if it's on the record or off the record.
THE VIDEOGRAPHER: The time right now is 12:02 p.m. We're now off the record.
(Whereupon, the deposition was adjourned.)

CERTIFICATE

I, MAUREEN O'CONNOR POLLARD, Registered Diplomate Reporter, Realtime Systems Administrator, and Certified Shorthand Reporter, do hereby certify that prior to the commencement of the examination, MIN LI, PhD, was remotely duly identified and sworn by me to testify to the truth, the whole truth, and nothing but the truth.

I DO FURTHER CERTIFY that the foregoing is a verbatim transcript of the testimony as taken stenographically by and before me at the time, place, and on the date hereinbefore set forth, to the best of my ability.

I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney nor counsel of any of the parties to this action, and that I am neither a relative nor employee of such attorney or counsel, and that I am not financially interested in the action.

____

MAUREEN O'CONNOR POLLARD
NCRA Registered Diplomate Reporter
Realtime Systems Administrator
Certified Shorthand Reporter
Notary Public

Dated: April 23, 2021

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Please read your deposition over carefully and make any necessary corrections. You should state the reason in the appropriate space on the errata sheet for any corrections that are made.

After doing so, please sign the errata sheet and date it. It will be attached to your deposition.

It is imperative that you return the original errata sheet to the deposing attorney within thirty (30) days of receipt of the deposition transcript by you. If you fail to do so, the deposition transcript may be deemed to be accurate and may be used in court.

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ACKNOWLEDGMENT OF DEPONENT

I, ___________________________, do Hereby certify that I have read the foregoing pages, and that the same is a correct transcription of the answers given by me to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet.

____
Min Li, Ph.D. Date

Subscribed and sworn
To before me this
_______ day of __________________, 20____.

My commission expires: _________________

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Notary Public

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